VOLUME 16/NUMBER 24
DECEMBER 23, 1978
ACC. NOS. N78-33035 TO N78-34034

STAR
AN ABSTRACT JOURNAL

Scientific and Technical Aerospace Reports

PRODUCED BY THE
SCIENTIFIC AND TECHNICAL
INFORMATION
BRANCH

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WHAT YOU CAN DO FOR *STAR*

All users of this abstract service are urged to forward reports to be considered for announcement in *STAR*. This will aid NASA in its efforts to provide the fullest possible coverage of all scientific and technical publications that might support aeronautics and space research and development. If you have prepared relevant reports (other than those that you will transmit to NASA, DoD, or DOE through the usual contract- or grant-reporting channels), please send them to NASA, Scientific and Technical Information Branch/NST-41, Washington, D. C. 20546, for consideration.

Reprints of journal articles, book chapters, and conference papers are also welcome. These will be considered for announcement in *STAR's* companion journal, *International Aerospace Abstracts*.

You may specify a particular source to be included in a report announcement if you wish; otherwise the report will be placed on public sale at the National Technical Information Service. Copyrighted publications will be announced but not distributed or sold.

PURCHASE OF *STAR*

The semimonthly issues and the cumulative index issues are available postpaid on subscription and in single copy from the Superintendent of Documents, United States Government Printing Office, Washington, D.C., 20402, United States of America.

Semimonthly issues...

Annual subscription rates: $60.00 domestic; $75.00 foreign. Price per single copy: $2.50 domestic; $3.15 foreign.

Cumulative index issues...

Annual subscription rates: $25.00 domestic; $31.25 foreign. Price per single copy varies according to number of pages.

Domestic subscription rates...

Apply to the United States, Canada, Mexico, and all Central and South American countries, except as noted below.

Foreign subscription rates...

Apply to Argentina, Brazil, French Guiana, Guyana, Surinam, Belize, and all other countries throughout the world.

Payment should be by check, money order, or document coupons, and must accompany order. Remittances from foreign countries should be made by international money order or draft on an American bank, payable to the Superintendent of Documents, or by UNESCO book coupons.

PUBLISHED BY:

UNITED STATES GOVERNMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
SCIENTIFIC AND TECHNICAL INFORMATION BRANCH
Scientific and Technical Aerospace Reports, Volume 16, is prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Information Systems Company.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through June 30, 1981.

US ISSN 0036-8741

INTRODUCTION

Scientific and Technical Aerospace Reports (STAR) is a major component of a comprehensive National Aeronautics and Space Administration information system covering aeronautics, space, and supporting disciplines. *STAR* is issued on the 8th and 23rd of each month and announces current publications of the following types:

- NASA, NASA contractor, and NASA grantee reports
- Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms
- Translations in report form
- NASA-owned patents and patent applications
- Dissertations and theses

Cumulative index volumes are published semiannually and annually.

Journal, book, and conference literature, cover-to-cover journal translations, and certain foreign dissertations are announced in a companion journal, *International Aerospace Abstracts (IAA)*, available on subscription from the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, N. Y. 10017.

ON-GOING RESEARCH PROJECTS

By arrangement between NASA and the Smithsonian Science Information Exchange (SSIE), a separate section of information on aerospace-related *On-Going Research Projects* is inserted into each issue of *STAR*. The insert presents titles of active NASA grants and university contracts, summary portions of recently updated *NASA Research and Technology Operating Plans (RTOPs)*, and notices of non-NASA research projects that were funded in the most recent or current fiscal year. The latter are selected by SSIE. The project announcements in the insert are arranged by *STAR* divisions but are otherwise entirely separate from *STAR*. They are not indexed nor machine-searchable by NASA. Current and retrospective searches are available from SSIE, 1730 M Street, N.W., Washington, D.C. 20036.

SUBJECT SCOPE

Subject scope of *STAR*, *IAA*, and *On-Going Research Projects* includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

OTHER NASA PUBLICATIONS

Other NASA publications and information services are described in the publication, *The NASA Scientific and Technical Information System...and How to Use It*, available without charge from the NASA Scientific and Technical Information Facility, P. O. Box 8757, B.W.I. Airport, Maryland 21240.

HOW TO USE STAR SUBJECT CATEGORIES

STAR is categorized by 10 major subject divisions divided into 74 specific subject categories and one general category/division. The major subject divisions are listed in the Table of Contents, together with a note for each that defines its scope and provides any cross-references. For example:

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

CROSS-REFERENCES

Individual *STAR* abstracts are not ordinarily cross-referenced, except for certain conference reports or book translations that have had separate abstracts written for their component papers or chapters. Citations and abstracts of the components follow immediately after those of the parent document. When the subject content of a component differs sufficiently from the general content of the parent, a cross-reference citation also is printed at the end of the category to which it normally would have been assigned if it were independent.

AVAILABILITIES

One or more sources from which a document announced in *STAR* is available to the public is given in each citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

Documents available on microfiche are designated by a pound sign (#) following the accession number. The pound sign is used without regard to the source or quality of the microfiche. Accession numbers followed by a plus sign (+) are not available on microfiche because of size or reproducibility.

Avail: NTIS. Sold by the National Technical Information Service. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page vii.

Microfiche[1] is available regardless of age for those accessions followed by a # symbol.
Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Unit.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the * symbol), use the N accession number. NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number. Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard $3.00 price, for those documents identified by a # symbol.)

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this Introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

(1) A microfiche is a transparent sheet of film, 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 26:1 reduction).

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: ZLDI. Sold by the Zentralstelle für Luftfahrtdokumentation und -Information, Munich, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of 50 cents each, postage free. (See discussion of patents and patent applications below.)

NASA PATENTS AND PATENT APPLICATIONS

Patents and patent applications owned by NASA are announced in *STAR* under appropriate subject categories and are referenced in the *STAR* indexes. In the Report/Accession Number Index, patents are indexed by the NASA Case Number (which appears in lieu of the report number in other indexes), the U.S. Patent Number, the U.S. Patent Application Serial Number, and the U.S. Patent Class. Patent applications for which patents have not yet been issued are indexed by the NASA Case Number and the U.S. Patent Application Serial Number.

NASA *patent application specifications* are sold in paper copy by the National Technical Information Service at price code A02 ($4.00 domestic, $8.00 foreign). Microfiche are sold at price code A01 ($3.00 domestic; $4.50 foreign). The US-Patent-Appl-SN- number should be used in ordering either paper copy or microfiche from NTIS. Printed copies of *patents* (which are not microfiched) are available for purchase at 50 cents per copy from:

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the Patent and Trademark Office. The patents and patent applications announced in *STAR* are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

Assistant General Counsel for Patent Matters/Code GP-1
National Aeronautics and Space Administration
Washington, D.C. 20546

ELIGIBILITY AND REGISTRATION FOR NASA INFORMATION PRODUCTS AND SERVICES

A variety of services, in addition to the distribution of NASA scientific and technical reports and of *STAR* and its cumulative indexes, is available to organizations of the following types that have registered with NASA to receive specific services or products:

1. NASA offices, research centers, contractors, subcontractors, grantees, and consultants;

2. Other U.S. Government agencies and their contractors;
3. Libraries in the United States that have arrangements with NASA to maintain collections of NASA documents for public reference;
4. Other organizations in the United States having a need for NASA documents in work related to aeronautics and space research;
5. Organizations abroad that have established reciprocal document exchange arrangements with NASA.

Only the central service points or central points of document acquisition and control within qualified organizations are eligible to register for NASA products and services. Domestic organizations that may be eligible to receive various classes of NASA publications and services should address their requests for registration or for further information to:

NASA Scientific and Technical Information Facility
Attn.: Registration Activity
P.O. Box 8757
B.W.I. Airport, Maryland 21240

Organizations abroad should direct requests to the same address, but to the attention of: Foreign Exchange and Acquisitions Branch.

AVAILABILITY OF STAR ABSTRACTS ON MICROFICHE

Microfiche of the abstract sections of this issue and other issues of *STAR* are available on annual subscription from NTIS, Attn: Subscriptions, 5285 Port Royal Road, Springfield, Virginia 22161. Annual subscription rates are $45.00 North America; $90.00 foreign. Abstract sections for previous years retroactive to 1964 are available at the current rates. Microfiche for individual *STAR* issue abstract sections are not available.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
750 Third Ave.
New York, N.Y. 10017

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents and
Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

ESA-Space Documentation Service
ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 8757
B. W. I. Airport, Maryland 21240

National Aeronautics and Space
Administration
Scientific and Technical Information
Branch (NST-41)
Washington, D.C. 20546

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey
1033 General Services Administration
Building
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

Zentralstelle für Luftfahrtdoku-
mentation und -Information
8 München 86
Postfach 880
Federal Republic of Germany

NTIS PRICE SCHEDULES

Schedule A

STANDARD PAPER COPY PRICE SCHEDULE

(Effective October 1, 1977)

Price Code	Page Range	North American Price	Foreign Price
A01	Microfiche	$ 3.00	$ 4.50
A02	001-025	4.00	8.00
A03	026-050	4.50	9.00
A04	051-075	5.25	10.50
A05	076-100	6.00	12.00
A06	101-125	6.50	13.00
A07	126-150	7.25	14.50
A08	151-175	8.00	16.00
A09	176-200	9.00	18.00
A10	201-225	9.25	18.50
A11	226-250	9.50	19.00
A12	251-275	10.75	21.50
A13	276-300	11.00	22.00
A14	301-325	11.75	23.50
A15	326-350	12.00	24.00
A16	351-375	12.50	25.00
A17	376-400	13.00	26.00
A18	401-425	13.25	26.50
A19	426-450	14.00	28.00
A20	451-475	14.50	29.00
A21	476-500	15.00	30.00
A22	501-525	15.25	30.50
A23	526-550	15.50	31.00
A24	551-575	16.25	32.50
A25	576-600	16.50	33.00
A99	601-up	-- 1/	-- 2/

1/ Add $2.50 for each additional 100 page increment from 601 pages up.

2/ Add $5.00 for each additional 100 page increment from 601 pages up.

Schedule E

EXCEPTION PRICE SCHEDULE

Paper Copy & Microfiche

Price Code	North American Price	Foreign Price
E01	$ 3.25	$ 6.50
E02	4.75	9.50
E03	6.25	12.50
E04	7.50	15.00
E05	9.00	18.00
E06	10.50	21.00
E07	12.50	25.00
E08	15.00	30.00
E09	17.50	35.00
E10	20.00	40.00
E11	22.50	45.00
E12	25.00	50.00
E13	28.00	56.00
E14	31.00	62.00
E15	34.00	68.00
E16	37.00	74.00
E17	40.00	80.00
E18	45.00	90.00
E19	50.00	100.00
E20	60.00	120.00
E99 - Write for quote		
N01	28.00	40.00

VOLUME 16 NUMBER 24 / DECEMBER 23, 1978

TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) 3167

02 AERODYNAMICS 3167

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

03 AIR TRANSPORTATION AND SAFETY 3170

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 3171

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 3174

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION 3175

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER 3176

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL 3177

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 3179

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*.

12 ASTRONAUTICS (GENERAL) 3179

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

13 ASTRODYNAMICS 3180

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) 3180

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES 3180

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION 3181

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING 3181

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 3182

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION 3182
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER 3182
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 3182
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 3182
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 3184
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS 3188
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 3194
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 3196
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) 3198
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 3200
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING 3206
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER 3212
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY 3217
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS 3219
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 3222
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 3224
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 3226
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) 3229

43 EARTH RESOURCES 3230
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION 3233
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION 3243
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 3247
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 3252
Includes weather forecasting and modification.

48 OCEANOGRAPHY 3254
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 3255
Includes genetics.

52 AEROSPACE MEDICINE 3256
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 3259
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 3260
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY N.A.
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 3262
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 3265
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS 3270
Includes computer networks.

63 CYBERNETICS 3271
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS 3272
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 3275
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 3277
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 3278
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) 3278
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS 3278
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS 3280
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 3282
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation.*

74 OPTICS 3283
Includes light phenomena.

75 PLASMA PHYSICS 3285
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS 3288
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS 3292
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) N.A.
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 3292
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 3293
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS N.A.
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE N.A.
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 3296
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 3297
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 3297
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 3298
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 3299
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 3299
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

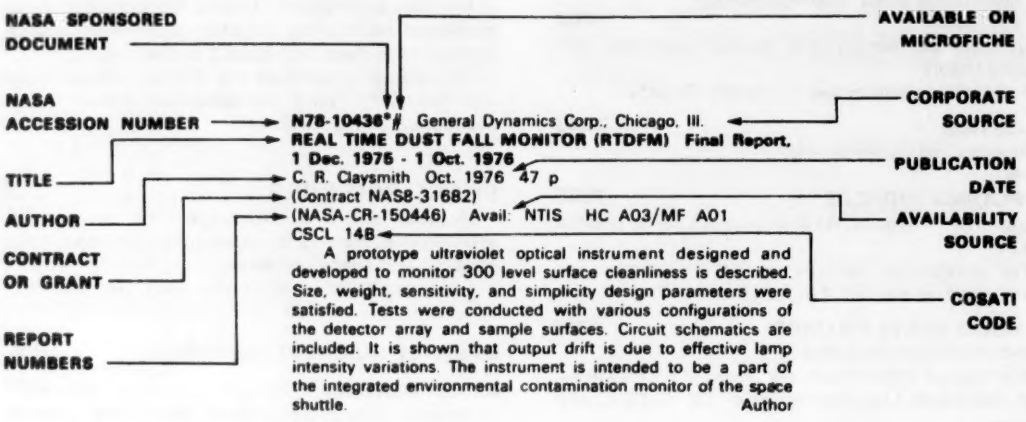
GENERAL

99 GENERAL 3299

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX I-1
PERSONAL AUTHOR INDEX I-47
CORPORATE SOURCE INDEX I-53
CONTRACT NUMBER INDEX I-67
REPORT/ACCESSION NUMBER INDEX I-71

TYPICAL CITATION AND ABSTRACT


NASA SPONSORED DOCUMENT
AVAILABLE ON MICROFICHE
NASA ACCESSION NUMBER
N78-10436*# General Dynamics Corp., Chicago, Ill.
CORPORATE SOURCE
REAL TIME DUST FALL MONITOR (RTDFM) Final Report, 1 Dec. 1975 - 1 Oct. 1976
TITLE
PUBLICATION DATE
C. R. Claysmith Oct. 1976 47 p
AUTHOR
(Contract NAS8-31682)
CONTRACT OR GRANT
(NASA-CR-150446) Avail: NTIS HC A03/MF A01
AVAILABILITY SOURCE
CSCL 14B
COSATI CODE
REPORT NUMBERS
A prototype ultraviolet optical instrument designed and developed to monitor 300 level surface cleanliness is described. Size, weight, sensitivity, and simplicity design parameters were satisfied. Tests were conducted with various configurations of the detector array and sample surfaces. Circuit schematics are included. It is shown that output drift is due to effective lamp intensity variations. The instrument is intended to be a part of the integrated environmental contamination monitor of the space shuttle.
Author

ON-GOING RESEARCH PROJECTS

This is a listing of research projects— not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power; Aircraft Stability and Control; and Research and Support Facilities (air). For Related Information See Also Astronautics.

1.0001, SOLUTIONS TO OPERATIONAL PROBLEMS ENCOUNTERED IN THE APPLICATION OF LASER DIAGNOSTIC SYSTEMS TO HELICOPTER ROTORS
H. WILLIAMS, Claremont College, Undergraduate School, Engineering, *Claremont, California* 91711 (NCA 2-283801)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

1.0002, MANNED, ENGINEERING FLIGHT SIMULATION VALIDATION
L.G. HOFFMAN, Systems Technology Inc., *13766 S. Hawthorne Blvd., Hawthorne, California* 90250 (DF140180; F33615-77-C-2065)

This work unit supports research and development into engineering manned flight simulation. The technology areas to be addressed are simulation fidelity requirements, simulator fidelity requirements, and simulator systems fidelity. Simulation fidelity requirements will define the system quantities, including response and behavior characteristics of pilot test subjects, which must be correlated with actual flight in order to satisfy experiment objectives. Simulator requirements will define those characteristics of simulated flight necessary to attain the desired simulation fidelity. Simulator systems fidelity will evaluate the potential to satisfy simulator fidelity requirements of the simulator hardware and software located at the flight control development laboratory. The objective of this work unit is to develop the technology to perform confident extrapolation of meaningful manned engineering flight simulation results to the real world environment. The development and application of these technologies will contribute to effective utilization of existing simulator hardware and software, and impact future simulator design.

Methods will be developed to specify simulation and simulator requirements. These methods will be applied to an analysis of terminal air-to-air combat simulation. Methods will be developed to evaluate simulator systems. These methods will be applied to an evaluation of the capacity of the LAMARS motion drive system to perform terminal air-to-air combat simulation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0003, STUDIES IN ROTOR AERODYNAMICS AND NOISE
K. KARAMCHETI, Stanford University, School of Engineering, Aeronautics & Astronautics, *Palo Alto, California* 94305 (NSG 2317)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

1.0004, AN ADVANCED COMPUTERIZED SYSTEM FOR ANALYSIS OF EYE-CAMERA RECORDINGS OF EYE-POINTING IN HELICOPTER PILOTS DURING REAL AND SIMULATED LANDINGS
P. SUPPES, Stanford University, School of Hum. & Sciences, Philosophy, *Palo Alto, California* 94305 (NSG 2322)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

1.0005, AIRBORNE X-BAND DOPPLER
B.L. TROTTER, U.S. Dept. of Commerce, Environmental Research Labs., *Boulder, Colorado* 80302 (RG120255)

To determine the problems involved in designing, installing and utilizing a pulse Doppler radar and its data processing systems when installed on the WP3D aircraft.

Completing the Doppler radar prototype; installing the Doppler radar and a NCAR data processing system in the WP3D aircraft; flight testing the radar by flying against chaff and storm cells being monitored by ground based radars and writing a report detailing the program results and recommendations for further development.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

1.0006, WIND TUNNEL EVALUATION OF AN AEROELASTICALLY CONFORMABLE ROTOR
R. BLACKWELL, United Technologies Corp., Sikorsky Aircraft Division, *N. Main St., Stratford, Connecticut* 06602 (DA0E3778; DAAJ02-77-C-0047)

Investigate the ability to improve rotor operational qualities (i.e., performance, efficiency, loads, stability and handling qualities) by deliberately designing aeroelastic properties to exploit the inherent tendency for blades to deform elastically. Determine if significant practical improvement can be made in rotor operational qualities reliability and maintainability, and cost. This effort will be directed toward generation of advanced data pertinent to advanced Army aircraft, including UTTAS, AAH, and ASH.

Conduct thorough review of effects of aeroelastic properties on rotor operational qualities. Select specific significant parameters and objectives which can be evaluated with existing technological capability. Perform rigorous phenomenological studies of the results of parameter variations using advanced analytical tools. Design and fabricate wind tunnel models, and perform comprehensive tests to substantiate analytical findings. Carefully review results to determine specific parametric trends for improving rotor design. Where practical, interpret trends in terms of full-scale design characteristics which may be applied in aircraft development.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Air Mobility Research & Development Lab.

1.0007, UTTAS EXTERNAL CARGO TERRAIN FLYING EQUIPMENT
T. GARNETT, United Technologies Corp., Sikorsky Aircraft Division, *N. Main St., Stratford, Connecticut* 06602 (DA0E3792; DAAJ02-77-C-0067)

To improve the capability of single suspension point helicopters in performing external load missions under terrain flying conditions.

A preliminary design of a system for converting a single point suspension system to a multi-point tandem system with minimum aircraft modifications and dedicated weight will be formulated using the UTTAS as a base. The design will be subjected to analysis to define and quantify parameters effecting both aircraft and mission performance.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0008, DEVELOPMENT OF ORGANIC MATRIX COMPOSITE AIRCRAFT ENGINE COMPONENTS

J. WINFREE, United Technologies Corp., Pratt & Whitney Aircraft Div, *P.O. Box 2691, West Palm Beach, Florida* 33402 (DN590173; N00019-76-C-0499)

To provide lower-cost, lighter-weight external components for military aircraft gas turbine engines using organic matrix composite materials.

Investigate composite molding techniques such as compression molding, lay-up, and winding. Investigate composite materials such as graphite-reinforced polyimides. Design, fabricate and test prototype parts in the laboratory.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0009, RESEARCH IN ADVANCED TECHNOLOGY INTEGRATION FOR GENERAL AVIATION - GENERAL AVIATION SYNTHESIS PROGRAM (GASP) IMPROVEMENTS

J. ROSKAM, Univ. of Kansas, School of Engineering, Aerospace Engineering, *Learned Hall, Lawrence, Kansas* 66044 (NSG 1543)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

1.0010, FRETTING FATIGUE IN THE PRESENCE OF OVERLOADS

J. ALIC, Wichita State University, School of Engineering, Mech Engin, *1845 Fairmont, Wichita, Kansas* 67208 (DF140960; AF-AFOSR-3422-77)

Structural safety of USAF aircraft is a continuing problem. To insure that prescribed levels of safety are achieved, methods must be developed to account for crack initiation at latent damage sites. The objective of this study is to explore the applicability of equivalent initial quality (EIQ) concepts for modeling fretting fatigue initiated crack damage. These methods will lead to improved crack growth analyses providing increased safety and reduced cost of ownership for USAF aircraft.

The basic procedure will be to experimentally investigate the influence of load interaction on fretting fatigue. This will be accomplished by concentrating on the possible effects of residual stress fields at localized stress concentrations such as crack nuclei and microcracks. Fretting fatigue tests will be conducted with periodic tensile or compressive half-cycles of large load amplitude (overloads) spaced throughout an otherwise constant amplitude load sequence. The results will be compared with constant amplitude tests (without overloads). Quantitative information on crack growth rates as well as the apparent or equivalent initial flaw size of fretting damage will be acquired and presented in forms usable in design analyses.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0011, AIRCRAFT STABILITY AND CONTROL ANALYSIS AT HIGH ANGLES OF ATTACK

R.K. MEHRA, Scientific Systems Inc., *1640 Massachusetts Ave., Cambridge, Massachusetts* 02138 (DN675668; N00014-76-C-0780)

At high angles of attack, the flying qualities of most high performance aircraft deteriorate due to undesirable characteristics such as roll coupling, directional divergence, and wing rock. These characteristics significantly reduce tracking capability and maneuverability, and often lead to loss of aircraft control. This program will develop an analytical framework of study for this flight regime, and identify designs of departure preventing control systems. the analysis is based upon the bifurcation and catastrophe theory methodology (BACTM).

General techniques will be developed for solving the nonlinear equilibrium equations of motion to obtain all branches of the equilibrium surface. These technqiues include: quasilinearization, Newton-Raphson, variable matric, and fixed point methods. Aircraft flight and wind tunnel data will be utilized to verify the resultant surfaces as functions of aircraft control parameters. The theory will be applied to spin equations of motion to investigate the cause of post-stall divergence, and techniques for spin prevention and recovery will be investigated.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

1.0012, ADAPTIVE CONTROL OF WING/STORE FLUTTER

C.A. HARVEY, Honeywell Incorporated, *600 2ND St. N.E., Hopkins, Minnesota* 55343 (DF140580; F33615-77-C-3096)

Fighters which are required to carry many combinations of external stores for various missions may have performance restrictions to avoid dangerous wing/store flutter instabilities. Conventional techniques (adding stiffness or ballast weight) to prevent flutter are generally not practical to suppress flutter when many external stores are added because one such 'fix' cannot solve all the many unstable modes which occur. The objective of this program is to study and evaluate active flutter suppression concepts which use adaptive feedback. Such a system should prevent many types of flutter modes for a wide variety of external stores and thus permit an unrestricted flight envelope.

A study will be conducted to evaluate the feasibility, practicality and potential application of various methods for adapting the feedback compensation of an active control system for suppressing wing/store flutter. Design criteria, methods for obtaining key flight/airframe data, decision mechanisms, complexity, important trade-offs, etc., will be established for each viable approach studied. The most promising approach for application to wing/store flutter suppression will be determined.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0013, LIFT SYSTEM INDUCED AERODYNAMICS OF V/STOL AIRCRAFT IN DYNAMIC ENVIRONMENT OF A MOVING DECK

J. KAMMAN, McDonnell Douglas Corporation, *P.O. Box 516, St. Louis, Missouri* 63166 (DN881373; N62269-77-C-0365)

The technical objective is to experimentally investigate the jet induced aerodynamics of a V/STOL aircraft operating in the dynamic environment of a moving deck.

A parametric test will be conducted using two scaled models of V/STOL aircraft of different configurations. Test parameters include aircraft height above deck, number and location of jet nozzles, and nozzle pressure ratio for deck motions including pitch, roll, and heave of various rates and amplitudes. Measured data will include the three components of force and moment for both static and dynamic conditions.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

1.0014, COANDA/REFRACTION EXHAUST NOISE SUPPRESSOR FOR AIRCRAFT HUSH-HOUSES

D. CROCE, U.S. Navy, Air Engineering Center, *Lakehurst Naval Air Station, Lakehurst, New Jersey* 08733 (DN896013)

To develop the coanda/refraction noise suppression concept with specific application to aircraft hush-house exhaust systems. To define a functional configuration for use with all Navy/Marine Corps aircraft.

Conduct an investigative program consisting of breadboard scale-model tests with simulated engine sources, analytic studies

and configuration analysis studies. Conduct aero/thermodynamics and acoustic analyses of tests performed with model flat-plate ejectors.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center

1.0015, LAUNCH AND RECOVERY SAFETY DEVICES
T. GIOA, U.S. Navy, Engineering Department, *Lakehurst Naval Air Station, Lakehurst, New Jersey* 08733 (DN696000)

The hectic pace of aircraft operations aboard aircraft carriers periodically result in accidents which cause injury or loss of life to personnel and damage or loss of aircraft and/or equipment. To reduce the possibility of these operational accidents, five areas concerning aircraft launching or recovery operations are under investigation and development. These are: (1) optimized jet blast deflector (JBD) to provide maximum environmental protection for personnel and aircraft; (2) high-strength Dupont 'Kevlar' cables and tapes for launch and recovery system use; (3) warning systems to alert pilots that a dangerous condition (such as bridle shedding) has occurred during catapulting; (4) fire-resistant lubricants for replacement of petroleum base lubricants in high-temperature (steam catapult) environments; (5) wire rope and terminal configuration optimization for high-energy recovery gear use.

(1) Advanced JBD, conduct comprehensive analytical studies and model tests. Analyze results, select prototype designs and conduct development tests on full-size JBD test site at NATF. (2) Develop weaving technology for high-strength tapes and cables made of Kevlar and develop related high strength terminals. (3) Develop pilot warning systems concepts compatible with launch system cycle and pilot reaction capability. (4) Investigate characteristics of high-temperature silicone (and other) lubricants for specific environmental conditions on catapult machinery. (5) Develop the fabrication, material, and dimensional parameters of wire ropes and terminals that will provide maximum safety and rope life for recovery systems.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0016, AIDS AIRCRAFT INTEGRATION (F-14)
B. AMOS, Grumman Corporation, Aerospace Corporation, *S. Oyster Bay Rd., Bethpage, New York* 11714 (DN881142; N62269-77-R-0188)

To provide inputs to aid in the development of the AIDS (advanced integrated display system). The AIDS program objective is to develop a totally new concept in modular cockpit instrumentation for naval air missions under all operational conditions, accomodating all aircraft sensors, and satisfying 1980 era requirements for dependability and supportability. This contract supports work unit ZA601, Agency Accession No. DN681080.

The contractor will examine the AIDS concepts in relation to a particular existing aircraft (F-14) manufactured by Grumman and project this evaluation to a future tactical aircraft such as is envisioned by Grumman.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

1.0017, FLIGHT TEST OF F-14 COMPOSITE COMPONENTS
R. CARLSON, Grumman Corporation, Aerospace Corp, *S. Oyster Bay Rd., Bethpage, New York* 11714 (DN781394; N62269-76-C-0268)

To demonstrate the flightworthiness of the F-14 composite overwing fairing and the main landing gear strut door throughout the F-14 flight regime critical for the overwing fairing. Flight testing will complete the requirements for certification of flightworthiness of these components prior to the introduction of a limited number of each into Navy fleet operations. This work is in support of work unit ZA-601, 'Aircraft Technology', Agency Accession No. DN 681080.

A limited quantity of F-14 composite overwing fairings and main landing gear strut doors have been fabricated under separate contracts. One ship set of overwing fairings and one left-hand main landing gear strut door will be installed on a structural test aircraft bailed to the contractor. The aircraft will be flown through selected portions of the F-14 flight regime critical for the overwing fairing. These maneuvers will be identical to those performed during qualification of the original metal overwing fairing. Data of the dynamic response of the fairings will be compared to existing data obtained for the production metal fairings to insure that the dynamic characteristics are acceptable. Accelerometers, strain gages and a fin pod camera to record fairing motion will be used to obtain the required data.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

1.0018, COMPOSITES COST TRACKING DATA AND ANALYSIS
B.I. RACHOWITZ, Grumman Corporation, Grumman Aerospace, *S. Oyster Bay Rd., Bethpage, New York* 11714 (DF139530; F33615-77-C-3022)

This work unit supports the effort to build up an accurate airframe design-to-cost capability. The advantages to be offered by this specific effort include the ability to estimate the cost of advanced composite airframe structures. The objective of this program are detailed manufacturing cost data for production aircraft structural components manufactured from advanced composite materials and validation of the advanced composites cost estimation model which was developed under a previous Air Force contract. This work will help in the design of military aircraft structures which meet mission requirements with the lowest life-cycle costs.

Cost data will be generated from actual observation of various steps in the manufacturing processes of composite parts and the recording of the man-hour data on a part-by-part, operation-by-operation basis. The cost model computer program will be exercised to make analytical predictions of the man-hours and these will be checked against the actual hours recorded.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0019, TASK IV X-22A FLIGHT RESEARCH PROGRAM
J.L. BEILMAN, Calspan Corporation, *1422 Genesses Ave., Buffalo, New York* 14221 (DN781297; N62269-76-C-0370)

The Task IV X-22A flight research program, scheduled to be completed in September, has the objective of expanding the operational capability of VTOL aircraft under adverse weather conditions. In particular, the Task IV program will concentrate on improving the IFR approach and landing capability of the AV-8B advanced Harrier (the current AV-8A minima are 400 ft. ceiling and 3,000 ft. visibility). This is the only in-flight simulation effort currently defined in this area and is being coordinated with the NavToLand Project Office, PMA-257 (Harrier Office) and MCAIR. This contract supports work unit ZA-601, Agency Accession No. DN 681080.

The proposed experiment will investigate a matrix of control, display and task variables during an extensive ground simulation phase followed by an in-flight simulation and evaluation phase. The in-flight simulation will be used to validate selected ground simulator configurations and investigate IFR to VFR transition.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

1.0020, NI76XB HIGH-PRESSURE TURBINE (HPT) BLADES FOR ADVANCED ENGINE APPLICATION
E. KERCIZNIK, General Electric Company, Aircraft Engine Group, *1 Jimson Rd., Cincinnati, Ohio* 45215 (DN696803; N00140-75-C-0355)

To operate advanced d.s. superalloy high pressure turbine blades in an advanced military engine at bulk metal temperatures 60 degrees F higher than is currently possible with the best conventional d.s. superalloys such as MAR-M-247 (HF) and MAR-M-200 (HF) and to achieve a 300-hour level of blade durability at this temperature.

The program is organized as follows: Phase I - manufacture trial blades in order to define casting parameters for blade manu-

facture - 6 months. Phase II - make engine-quality blades. Cast two blade sets plus spares but machine only one set for subsequent engine tests - 11 months. Phase III - engine assembly and test - 9 months.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center

1.0021, TURBINE ENGINE COMBUSTION TECHNOLOGY

R.P. BRADLEY, U.S. Air Force, Aeropropulsion Laboratory, *Wright Patt. A.F.B., Dayton, Ohio* 45433 (DF462060)

Quantify the effects of fuel character variation on current combustion systems and examine methods of reducing these effects. Determine the benefits of main burner and afterburner catalytic combustion. Evaluate non-perturbing instrumentation to measure temperature and specie concentration within practical combustion devices.

Conduct combustor rig tests in RM 20 using the F101, catalytic combustor, and combustion tunnel and conduct afterburner tests in c-stand using the J85. Vary fuel properties, test conditions, and hardware configurations while measuring emissions, temperatures, pattern factors and performance parameters using conventional and in situ techniques.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

1.0022, ADVANCED AERODYNAMICS, HIGH LIFT AND MANEUVER AUGMENTATION

S.C. STUMPFL, U.S. Air Force, Flight Dynamics Lab., *Wright Patt. A.F.B., Dayton, Ohio* 45433 (DF141760)

Advanced tactical aircraft currently under study are being driven toward much higher wing loading to permit supersonic penetration of highly sophisticated defenses. Aircraft designed to these requirements can be at a disadvantage for an off-design mission or in an air combat situation. The objective of this effort is to identify and evaluate promising aerodynamic technologies for improving the mission performance of a variety of Air Force aircraft but with emphasis on increasing the maneuver capability of high wing loading aircraft through favorable airframe-propulsion system interaction, i.e., powered lift.

Individual investigative efforts will proceed from literature search through analysis and payoff assessment to experimental validation and prediction methods development. Contracted efforts will be used to augment and complement this in-house work unit as required. Maneuver augmentation through application of powered lift is to be investigated in the AFFDL trisonic wind tunnel (TGH) with a half-span, vectored-engine-over-wing model. Results will be correlated with large-scale, full-span results of the same powered lift concept acquired under contract work unit 14760316. This serves to validate the TGF half-span test facility after which additional parametric variations will be tested to expand the data base for design purposes. High-altitude, long-endurance aircraft improvements will be sought through advanced airfoil design. Wind-tunnel tests of suggested airfoil sections will be conducted in appropriate facilities and recommendations made to user organizations.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0023, INTEGRATED CONTROL DESIGN TECHNIQUES (PHASE I)

L.S. GEPHART, Univ. of Dayton, School of Business Admin., Management Science, *300 College Park Ave., Dayton, Ohio* 45409 (DF141490; F33615-77-C-3072)

It is necessary to formulate, demonstrate and validate a total systems approach to provide the managment tools and methodologies for early military aircraft flight control development decisions. The tools exist separately to achieve individual goals for mission performance, reliability, maintainability, redundancy management, safety, and even digital logic for system reconfiguration. The objective of this program is to integrate these tools into a composite design discipline. The end product of this program is a set of management tools and methodologies that can be applied to future integrated control systems purchased by the Air Force.

The program is based on the digital application of system effectiveness modeling with considerations provided to future requirements in the areas of redundancy management, mission safety, and positive alert. Realistic considerations concerning changes in the functional and/or mission requirements relative to the present and future states of the mission will also be evaluated for possible inclusion into the model.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0024, NAVY VEHICLE DESIGN AND CONSTRUCTION - FRACTURE OF METAL-MATRIX COMPOSITES

A. LAWLEY, Drexel University, School of Engineering, Metallurgical Engin, *32nd & Chestnut Sts., Philadelphia, Pennsylvania* 19104 (DN723636; N00014-76-C-0205)

This research effort is directed towards increasing our understanding of how interfacial structure affects mechanical properties of composite materials. The researchers will examine the effects of elevated temperature and forging on the structure and properties of metal-matrix composites. The work is aimed primarily at future applications of composites in hot sections of jet engines.

Research will be completed on an analysis of forging behavior of metal-matrix composites. The eutectic system Co,Cr-(Co,Cr)7C3 will be forged in plane strain and forming-limit criteria derived. Effects of thermal cycling and mechanical fatigue on the structure of this composite will be found in a parallel part of the program.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

1.0025, VTX AVIONICS SUITE ANALYSIS

J. DAVIS, Veda Incorporated, *1360 Industrial Hwy., Southampton, Pennsylvania* 18966 (DN881087; N62269-77-M-3449)

Design definition study of undergraduate trainer aircraft avionics systems. This contract supports work unit DH815, Agency Accession No. 233303.

Study proposed definition of each of three avionic suites: optimum, intermediate, and austere. Task includes submission of schematic diagrams, summary of weights, volumes, required electrical power, costs, and cost/performance.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

1.0026, HELICOPTER RECOVERY SYSTEMS FOR ASW STORES

J.H. CAMISA, U.S. Navy, Underwater Systems Center, *Newport, Rhode Island* 02840 (DN589517)

The overall objective is to develop and evaluate helicopter recovery ASW stores systems and equipment for potential use in land-based and open ocean recovery operations. Of particular importance at this time are: A. Development of an experimental shock mitigation device to improve helicopter rescue hoist/recovery equipment compatability. B. development of an experimental modified MK 44/ADDS recovery cage to improve recovery efficiency, flight characteristics and at-sea based capabilities. C. Development of an experimental stowable recovery system for a wide range of ASW stores.

A. Investigate the helicopter rescue hoist/recovery equipment interface for acceleration and loading characteristics. Develop and evaluate experimental shock mitigating devices to decrease shock loadings experienced during hoist operation. B. Develop an experimental MK 44/ADDS recovery cage with a larger skirt and barrel to improve flight characteristics, recovery efficiency and open ocean capability. Flight-test the experimental cage to demonstrate recovery and establish flight envelopes. C. Develop an experimental recovery system of fixed (non-stowable) skirt design. Evaluate recovery techniques and cage configurations for various modes of recovery. Incorporate stowing concepts into skirt. Flight test the completed experimental model for flight envelopes, stowage, deployment and recovery.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0027, ADVANCED AIRCRAFT STRUCTURES
UNKNOWN, Telcom Incorporated, Telcom Systems Incorporation, *2300 S. 9TH St., Arlington, Virginia* 22204 (DN790045; N00019-77-C-0376)

Identify the potential significance of advanced structural materials in relation to navy aircraft system performance requirements and the effectiveness of improved airborne instrumentation and data analysis methods in gaining more economic utilization of navy aircraft structural life.

Perform engineering study to identify parameters most significantly influencing development and transition into initial use of advanced aircraft construction and improvements to the structural life management process employed for navy aircraft.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0028, MINIMIZATION OF DIFFERENCES BETWEEN SIMULATED AND ACTUAL FLIGHT DATA FOR AREA NAVIGATION (R-NAV) ON HIGH SPEED AIRCRAFT
A. HARGROVE, Hampton Institute, Graduate School, Electrical Engin, *Hampton, Virginia* 23368 (NAS 1-15445)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

1.0029, HT RM 78-22 - ANALYSIS OF INCREMENTAL CHANGES IN USEFUL LOADS
UNKNOWN, U.S. Army, Applied Technology Laboratory, *Fort Eustis, Newport News, Virginia* 23604 (DA0E3829)

After an aircraft is in the Army inventory, minor changes are made which alter the useful load of the aircraft. Such changes affect the ability of the aircraft to meet its mission, so the cost of additional resources necessary to accomplish a given task must be assessed. The objective of this program is to develop a technique to use when analyzing the cost, in terms of meeting a constant objective, of incremental reduction in useful load in fielded aircraft.

The technical objective will be accomplished in seven steps:(1) literature search; (2) definition of parameters to be studied; (3) development of analysis technique (measures of worth); (4) data definition and collection plan (R and M cost); (5) definition of aircraft operating environment; (6) detailed analysis of aircraft operating characteristics; and (7) preliminary example study.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

ASTRONAUTICS

Includes Astronautics (general); Astrodynamics; Ground Support Systems and Facilities (space); Launch Vehicles and Space Vehicles; Space Transportation; Spacecraft Communications; Command and Tracking; Spacecraft Design, Testing, and Performance; Spacecraft Instrumentation; and Spacecraft Propulsion and Power. For Related Information See Also Aeronautics.

2.0001, COMMUNICATIONS - SPACECRAFT CHARGING EXPERIMENT
S.E. DEFOREST, Univ. of California, Graduate School, Physics, *P.O. Box 109, San Diego, California* 92037 (DN675252; N00014-76-C-0432)

Spacecraft charging is the probable cause of failure of satellite electronic systems and could affect Navy satellite communications systems. The objective of the experimental program is to investigate the charging phenomenon and to specify design criteria and procedures to prevent the adverse effects of spacecraft charging.

A particle detector to measure the energy and pitch angle distribution of proton and electron fluxes in the 1 ev to 70 kev energy range is being designed and tested for flight on the Air Force SCATHA spacecraft with a planned launch date in January, 1979. Data from this detector will be used to define the properties of the ambient plasma and particle flux, and to infer charging potentials, prior to and during periods of satellite charging and allow for the interpretation of the charging phenomena observed.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, HIGH MODULUS GLASS FIBERS BY IONIC AND ATOMIC STUFFING
J.D. MACKENZIE, Univ. of California, School of Engin. & Appl. Sci., Materials Engineering, *405 Hilgard Ave., Los Angeles, California* 90024 (NSG 2321)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

3.0002, FILM SYNTHESIS AND NEW SUPERCONDUCTORS
T.H. GEBALLE, Stanford University, School of Engineering, Materials Science & Engin, *Palo Alto, California* 94305 (DF050440; F49620-78-C-0009)

AF function - high-temperature superconducting materials are needed for application in airborne multimegawatt power generation and conditioning systems. Opportunity - research specifically directed toward the synthesis and characterization of high transition temperature metallic compounds can provide a greater margin of design efficiency and operational reliability than presently available superconductors. Objective - the research studies fundamental mechanisms which give rise to superconductivity, explores the occurrence of superconductivity in compounds and composites, synthesizes films with optimal superconducting transition temperatures, and seeks a model for predicting high-temperature (above 23 degrees K) superconducting state in metastable metallic phases. How work contributes - the performance of high field magnets and solenoids, electric motor windings, superconducting rotors in power generators, transformers and induction energy storage systems could be significantly improved if the upper critical field, the current-carrying capacity and the critical transition temperature of the superconducting material could be enhanced.

Metastable phase equilibria at lower temperatures are being studied by utilizing the unique capability of the electron-beam codeposition apparatus to lay down intimate mixtures of two or more components on a substrate whose temperature is subject to independent control. The high superconducting transition temperature A-15 phases are being investigated. Particular attention is given to Nb3Ge, Nb3Si, and ternary compounds derived from them. The superconducting properties are being correlated with the new phases using sensitive thermal and electrical techniques as well as crystallographic and metallurgical methods.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0003, INORGANIC CRYSTAL CLATHRATES DEVELOPMENT AND MODELLING OF A NEW CONCEPT IN FIRE CONTROL
A.C. LING, Calif. State Univ. & Colleges, School of Science, Chemistry, *Washington Sq., San Jose, California* 95114 (NCA 2-675806)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

3.0004, INTERSTITIAL ENCAPSULATION OF SOLID INORGANIC HALONS (ABBREV)

L.A. MAYER, Calif. State Univ. & Colleges, School of Science, Chemistry, *Washington Sq., San Jose, California* 95114 (NCA 2-675807)

An investigation of the synthesis and characterization of thermally activated flame quenching and suppressing agents.

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

3.0005, DEVELOPMENT OF DIRECTIONALLY SOLIDIFIED EUTECTIC NICKEL ALLOYS

F. LAMKEY, United Technologies Corp., Research Laboratories, *400 Main St., Hartford, Connecticut* 06108 (DN890060; N62269-77-C-0055)

To develop the ductile matrix/ductile fiber eutectic gamma prime/gamma plus alpha nickel base alloy for turbine blading operable at 1850 degrees and above.

Elements are being added to the system based on Ni-31% Mo-6.2% Al, including Cr, CO, Fe, Ta, W, Re, Ti and C. Strength, ductility, oxidation-sulfidation resistance, thermal fatigue, and creep are being evaluated.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0006, MODIFICATION OF SURFACE PROPERTIES

J.K. HIRVONEN, U.S. Navy, Res. Laboratory, *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN780183)

To improve the corrosion resistance and load carrying ability of aircraft bearing and gear steels by ion implantation while maintaining compatibility with MIL-l-23699B lubricants.

Design and conduct a series of corrosion tests on bearing steels (AISI M50 VIMVAR) which have been implanted with various concentrations of ions of various elements. The ions of the elements chromium, nickel, molybdenum, tantalum, and rhenium are to be considered for implantation. The test series will be conducted to optimize the density of the implanted ions with respect to the corrosion resistance of the steel. Metallographic examination of the surfaces may be conducted to determine the effects of the ion implantation on the corrosion properties of the steel. The optimized concentration of ions will then be applied to rolling contact fatigue (RCF) test rods for fatigue testing at NAFTC under various lubrication regimes. All test specimens will be provided by NAPTC.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center

3.0007, THEORETICAL AND COMPUTATIONAL METHODS OF MOLECULAR COLLISION DYNAMICS

D.A. MICHA, State University of Fla. Sys., School of Arts & Sciences, Chemistry, *204 Tigert Hall, Gainesville, Florida* 32601 (CHE77-20510)

Dr. Micha will apply general and rigorous theories of collisions in many-body systems to the calculation of cross sections of molecular processes. Firstly, he will continue work on a unified description of energy transfer and reaction in atomic-diatomic collisions, including collisional dissociation and semi-empirical models. He will develop a general theory for three-atom systems at thermal energies, for general interactions. Secondly, he will incorporate electronic energy and charge transfer in atom-diatomic collisions, involving the lowest multiplets of atoms and diatomics. Thirdly, he will develop computational methods for calculating momentum distributions of diatomics, for on- and off-energy-shell transition amplitudes, and for solving the singular integral equations of three-atom rearrangements. Applications will concern hydrogen, alkali, halogen, and noble gas atoms and ions, and hydrogen and halogen diatomics. This work is a continuation of that currently supported by Foundation grant CHE-7501077.

SUPPORTED BY U.S. National Science Foundation, Div. of Chemistry

3.0008, REACTIONS OF METASTABLE ATOMS AND MOLECULES

E.E. MUSCHLITZ, State University of Fla. Sys., School of Arts & Sciences, Chemistry, *204 Tigert Hall, Gainesville, Florida* 32601 (CHE76-17244 A03)

Dr. Muschlitz will continue experimental research on transfer of electronic excitation energy in molecular collisions using molecular beams, optical, and mass spectrometric techniques (currently supported by NSF Grant GP-30846X). In particular, more precise determination of the velocity dependence of absolute cross sections for Penning and association ionization will be made for reactions of state-selected beams of helium metastable atoms with various gases. New molecular beam investigations will be made of the velocity dependence of fluorescence following electronic energy transfer in collisions of metastable rare gas atoms. In particular, the vibrational energy distribution of product species will be determined by spectroscopic analysis of the emitted light. The results of these experiments would provide detailed answers concerning the mechanism of these bimolecular energy transfer processes which are of considerable importance in our understanding of upper atmosphere phenomena and the mechanism of laser action.

SUPPORTED BY U.S. National Science Foundation, Div. of Chemistry

3.0009, EXPERIMENTAL AND THEORETICAL STUDIES OF LIQUIDS, MOLECULAR CRYSTALS AND THEIR SURFACES

S.A. RICE, Univ. of Chicago, School of Physical Sciences, Chemistry, *5801 S. Ellis Ave., Chicago, Illinois* 60637 (CHE77-06486 A01)

Rice is pursuing a program of research on the electronic structure and atomic configuration of liquid surfaces, the electronic structure of molecular crystal surfaces, and vibrational relaxation in liquids and molecular crystals. In each case the approach taken consists of a mixture of experimental and theoretical investigations.

The structure of the surface of liquid metals is being probed by low angle X-ray reflectance, by surface plasmon dispersion measurements and by measurement of the fluorescence lifetime of adsorbed molecules. Detailed information on the electronic structure of surface layers will be used as a guide to theoretical development. This work will be extended from simple metals to alloys and to surfaces with adsorbed films.

The surfaces of molecular crystals will be studied for a variety of materials such as anthracene by detailed examination of surface excitations and by the development of theory. In addition, the vibrational states of polyatomic molecules in the liquid state will be studied by picosecond spectroscopy. The theory of vibrational relaxation in liquids will be developed.

This research is a continuation of that currently supported by Foundation Grant, CHE-7408377.

SUPPORTED BY U.S. National Science Foundation, Div. of Chemistry

3.0010, MATERIALS SUPPORT TECHNOLOGY - PHOTO AND IMPURITY EFFECTS IN AMORPHOUS COVALENT SYSTEMS AND FORMATION OF AMORPHOUS METALLIC ALLOYS

D. TURNBULL, Harvard University, School of Arts & Sciences, Engineering & Applied Physics, *16 Divinity Ave., Cambridge, Massachusetts* 02138 (DN775040; N00014-77-C-0002)

Recent research results indicate unique properties of amorphous materials suggesting possible Navy use in soft magnet applications, photosensitive materials, high-strength reinforcements, magnetic bubble materials, etc. This effort will investigate several factors which affect the structure and properties of these interesting materials.

This program will explore the photosensitive nature of A-As2Se3 and compare the results to A-Se, which has previously been shown to crystallize as a result of photoillumination. Factors affecting retention of the amorphous state in metals will be determined. Of special interest are compositional and thermal effects on formation and crystallization of these glassy metals. Accordingly, diffusivity and viscosity behavior below TG will be determined.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0011, CHEMICAL DYNAMICS OF BIMOLECULAR REACTIVE COLLISIONS

W.R. GENTRY, Univ. of Minnesota, School of Liberal Arts, Chemistry, *322 Johnston Hall, Minneapolis, Minnesota* 55455 (CHE76-11369 A02)

This research will involve study of the dynamics of chemical reactions using the merged molecular beam technique. Examples of future research include studies of (1) threshold behavior and resonance effects in endothermic ion-molecule reactions, the prototype process being H plus 2 (v equals O) plus He yields HeH ion (v') plus H, (2) the effect of reagent vibrational energy on the dynamics of ion-molecule reactions, utilizing our ability to create highly vibrationally excited H2 by charge-exchange neutralization of H plus 2, (3) ion-molecule reactions involving electronically excited atoms such as He (21S, 23S), (4) associative ionization reactions, including the reaction CH plus O yields CHO ion plus e minus, which is very important in combustion chemistry, and (5) resonance behavior of the H ion plus D yields H plus D ion charge transfer cross section at low kinetic energies. Finally, a supersonic jet ion source for the production of thermally relaxed ion beams will be constructed in order to extend the range of applicability of the existing merged-beam instrument. This work is a continuation of research begun under grant GP-38759X.

SUPPORTED BY U.S. National Science Foundation, Div. of Chemistry

3.0012, CALCIUM INORGANIC ELECTROLYTE BATTERIES

B. HIGGINS, Eagle Picher Industries Inc., *Joplin, Missouri* 64801 (DF461010; F33615-77-C-2020)

To explore the performance, safety, storage and life-cycle cost potential of calcium-thionyl chloride and calcium-sulfuryl chloride batteries as a safer battery than lithium inorganic battery. Applications of interest include power for life-support equipment, spacecraft, and missile standby/emergency ground equipment.

Consists of two phases: (1) development of cells and establishing basic data on both type batteries against a multitude of load possibilities. Select best potential approach, either thionyl chloride or sulphuryl chloride for follow-on work in second phase, (2) further investigation mechanisms of selected approach and solution of problems on major deficiencies impeding safety and reliability. Additional investigations toward increased performance and demonstration in full-scale experimental hardware.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

3.0013, SERVICE EVALUATION OF GRAPHITE COMPOSITES IN CONTACT WITH METALS ON F-4

J.F. BRADY, McDonnell Douglas Corporation, *P.O. Box 516, St. Louis, Missouri* 63166 (DN781219; N62269-76-C-0280)

To obtain environmental data under Navy operational usage for (1) verifying the effectiveness of current design and material selection criteria, (2) verifying corrosion prevention methods used in graphite/epoxy-metal combinations, and (3) determining amount and rate of water absorption and its effect on mechanical properties of graphite/epoxy composites in naval aircraft. This contract is in support of work unit ZA101, 'Aircraft Technology', Agency Accession No. DN 681080.

Four sets of access doors (1 vertical and 1 horizontal per set) will be fabricated with test specimens attached, including graphite laminates, simulated mechanical fastened joints, adhesive-bonded joints, and sandwich elements. The access doors will be installed on 4 carrier-based F-4 aircraft (one set each), and during an exposure period of 2 yrs., the test access doors will be inspected and test specimens removed periodically for moisture absorption analysis. At the end of 2-yr. exposure, the access doors will be returned to NavAirDevCen for further nondestructive and destructive evaluation.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

3.0014, GSE CORROSION CONTROL

B. BYRNES, U.S. Navy, Air Engineering Center, *Lakehurst Naval Air Station, Lakehurst, New Jersey* 08733 (DN696019)

To define the principal and typical corrosion areas in ground support equipment (GSE) as a means of determining the extent and severity of the corrosion problem. To prepare a corrosion control manual (similar to 01-1A-509) oriented specifically to GSE.

Survey 3M data banks for GSE corrosion pictures for past two years. Make pictorial field survey of corrosion in operational GSE. Prepare corrosion control manual based on state-of-the-art techniques and corrosion findings.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0015, COMPATIBILITY OF LUBRICANTS WITH ADVANCED BEARING AND GEAR MATERIALS

R. VALORI, U.S. Navy, Air Propulsion Test Center, *Trenton, New Jersey* 08641 (DN796811)

To assure the availability of lubricant/steel combinations for future propulsion systems which have optimum reliability with respect to bearing and gear performance.

Candidate bearing steels in combination with advanced ester lubricants will be evaluated for their rolling contact fatigue, scoring, friction and wear characteristics on two bench testers namely: the rolling contact (RC) fatigue machine and geared roller test machine (GRTM). The test will cover a range of temperature, load, sliding and rolling conditions. In addition various ratios of elastohydrodynamic (EHD) lubricant film to composite surface roughness will be run to determine the scalability of this factor to various lubricant/steel combinations. At least ten different bearing steels will be used in the program over a four-year period. These will include four case-hardened steels, three wrought steels. Any promising other new steels which become available during the course of this program will also be evaluated. Those which are corrosion resistant steels will be evaluated for their corrosion resistance by a modified ASTM test method. All tests will be compared to Hercolube A lubricant/M50 steel as a base line.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Material Command

3.0016, PREBIOTIC SYNTHESIS - BIOMOLECULES FROM HCN

J.P. FERRIS, Rensselaer Polytechnic Inst., School of Science, Chemistry, *110 8TH, Troy, New York* 12181 (CHE76-11000 A02)

The isolation of orotic acid by the hydrolysis of the HCN oligomers suggests that pyrimidines and pyrimidine derivatives may have been formed from HCN on the primitive earth. The conversion of orotic acid to uracil and orotidine as part of the further investigation of this prebiotic pathway to pyrimidine nucleosides is being investigated. The decarboxylation of orotic acid is being attempted in the presence of anions which may have existed on the primitive earth. The investigation of the synthesis of orotodine starts with a study of the reactions of alkali metal and transition metal salts or orotic acid with a bromoribose derivative. When the factors which control orotidine synthesis are more clearly understood the reaction will be studied using a prebiotic ribose derivative. The investigation of the products formed by the hydrolysis of the HCN oligomers to see if other classes of biomolecules besides purines, pyrimidines and amino acids are formed is being continued. The pathway for the oligomerization is being probed using carbon-14 labelled and N-alkyl derivatives of diaminomaleonitrile. The effect of clay on the oligomerization of HCN and peptide bond formation mediated by HCN oligomers is being investigated. This work is a continuation of that currently supported by Foundation grant, GP-40080X.

SUPPORTED BY U.S. National Science Foundation, Div. of Chemistry

3.0017, NAVY VEHICLE DESIGN AND CONSTRUCTION - INVESTIGATION OF ALLOY SEGREGATION IN ALUMINUM ALLOYS USED FOR NAVAL AIRCRAFT

G. JUDD, Rensselaer Polytechnic Inst., School of Engineering, Materials Engineering, *110 8TH St., Troy, New York* 12181 (DN923248; N00014-75-C-0504)

In many aluminum alloys used in naval aircraft segregation of alloying elements can occur during the heat treatments used to develop high strength levels. Such segregation can lead to problems such as low ductility or stress corrosion cracking under certain stress and environmental conditions. The objective of this research is to study segregation in various aluminum alloys in order to determine methods of controlling it and to eliminate its harmful features.

Alloy segregation in aluminum alloys based on the Al-Mg-Zn system is to be studied by means of electron microprobe analysis. Substructural features are to be assessed by means of transmission electron microscopy. Aging characteristics, segregation and structure resulting from various heat treatments and additions of trace elements will be determined. The relationship between structure, mechanical properties and stress corrosion resistance will be made using current mechanical testing methods.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0018, SOLIDIFICATION PROCESSES INVOLVING SOLLITES

UNKNOWN, Rensselaer Polytechnic Inst., Graduate School, *110 8TH, Troy, New York* 12181 (NAS 8-32690)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

3.0019, STRAIN GAGE ATTACHMENT TO COMPOSITES

J.L. MULLINEAUX, U.S. Air Force, Flight Dynamics Lab., *Wright Patt. A.F.B., Dayton, Ohio* 45433 (DF141470)

This work unit supports the structural testing of aircraft components made from composites containing epoxy matrix material. The strength of the composite matrix is affected by a combination of elevated temperature and high-humidity environments. Strain gage transducers can be used to determine the effects if the transducers are themselves impervious to the environment. This work unit will investigate techniques to obtain reliable data from strain gages installed on composite parts which are exposed to elevated temperature and humidity. The data from such transducers will greatly contribute to the flight safety of military aircraft.

This program will investigate non-epoxy adhesives as bonding agents and RTV silicon materials as coatings for strain gage installations on composites.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

3.0020, RESEARCH ON CORROSION AND CORROSION-RESISTANT STRUCTURAL AND PROPULSION SYSTEMS MATERIALS

S.J. KETCHAM, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974 (DN833088)

Since the overall structural integrity of naval aircraft has a critical dependence on the elimination of catastrophic failures due to corrosion and/or embrittlement, work in this unit involves research on the interactions of environment and stress on high-strength alloys and composite materials as they relate to corrosion susceptibility and propensity to environmental cracking, and on ways to measure and mitigate these factors.

Research is being pursued on the mechanisms and detection of microstructural corrosion and environmental cracking of high-strength steels and aluminum alloys by advanced state-of-the-art metallurgical and electrochemical techniques, on the corrosion response of advanced systems, e.g., composite materials, and on new laboratory accelerated corrosion tests and corrosion/embrittlement detection systems for fleet use.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0021, ENVIRONMENTAL DEGRADATION OF SANDWICH PANELS

R.E. TRABOCCO, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974 (DN681033)

To study and mitigate the combined degradation environmental effects of moisture, U.V., temperature, and SO2 on Gr/E faced adhesively bonded honeycomb materials.

Gr/E faced honeycomb panels will be subjected to various cumulative and cyclic environmental exposures. Panels will be exposed in the unstressed and stressed conditions that most nearly simulate actual aircraft service conditions. The extent of degradation of these panels will be assessed and methods of mitigation determined. Work will also be performed on contract as reported in work unit DG302B.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0022, SOLAR RADIATION ON GLASSES

D.L. KINSER, Vanderbilt University, School of Engineering, Materials Science & Engin, *21st Ave. S., Nashville, Tennessee* 37203 (NAS 8-32695)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

3.0023, INTERACTION OF NUMERICAL AND DYNAMICAL STABILITY

V.G. SZEBEKELY, Univ. of Texas, School of Engineering, Aerospace Engin & Engin Mech, *200 W. 21st, Austin, Texas* 78712 (NAS 9-15567)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

3.0024, FEASIBILITY OF DIESEL FUEL MARINE AS AN EMERGENCY AIRCRAFT FUEL

D. NAEGELI, Southwest Research Institute, *8500 Culebra Rd., San Antonio, Texas* 78228 (DN789777; N00140-77-C-1345)

Evaluate the combustion characteristics and exhaust emissions of special alternative fuels for aircraft gas turbine engines. This work is in support of work unit DN789752.

Perform tests in a research combustor and a gas turbine engine combustor using marine diesel fuel, blends of marine diesel with JP-5, and other alternative fuels. Evaluate combustion performance, flame radiation and exhaust emissions.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center

3.0025, MEASUREMENT OF THERMAL DIFFUSIVITY OF CARBON/CARBON FIBER COMPOSITES FROM 20-3,000 DEGREES C

R. TAYLOR, Victoria Univ. of Manchester, *Oxford Rd., M13 9PL, Manchester, England, United Kingdom* (DF050060; AFAFOSR-3449-77)

AF function - weapon delivery. Deficiency - in order to design, develop and evaluate carbon/carbon composites for use in reentry vehicles and rockets, the transport properties must be determined to accurately refine the temperature field and calculate the thermal response within nosetips, heat shields, and rocket nozzles. Objective -in this research, detailed experimental data will be obtained and used to derive an analytical model which relates thermal diffusivity at temperatures up to 3,000 K to matrix properties, fiber volume and orientation, and pore structure of carbon/carbon composites. How work contributes - if a successful model is obtained, it will go a long way toward satisfying the noted deficiency. But in any case, the reliable thermal diffusivity data will in themselves be useful to AF technology.

Using the laser heating pulse method already developed at the University of Manchester, thermal diffusivity from ambient to 3,300 degrees K will be measured for carbon/carbon composites of various geometries, fiber type and matrix properties. Samples, and all available information relative thereto, will be furnished by

AFML. Additional characterization will be obtained by the contractor through metallography, electron microscopy and x-ray diffraction. Correlation of measured thermal diffusivities with structures and other properties, leading to semi-empirical heat transport models, will be carried out.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0026, A STUDY OF FLAMMABILITY SCREENING TESTS OF RESINS
B.M. HUGHES, Utah Higher Education System, School of Engineering, Materials Science & Engin, *1400 E. 2ND S., Salt Lake City, Utah* 84112 (NAS 2-9950)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, HOLOGRAPHIC LENSES FOR MISSILE GUIDANCE
B.D. GUENTHER, U.S. Army, High Energy Laser & Res. Lab., *Redstone Arsenal, Huntsville, Alabama* 35809 (DA0F1397)

To evaluate holographic lens technology for missile guidance application.

Construct a step zoom lens demonstration operating at 632.8 mm followed by the design and construction of a zoom lens that would demonstrate the ability to perform a beam rider type mission. Evaluate the performance of a corrector plate that would allow a missile to use a high performance aerodynamic profile without hampering the electro-optical subsystem.

SUPPORTED BY U.S. Dept. of Defense, Missile Research & Development Command, High Energy Laser & Research Lab.

4.0002, ADVANCED RADIAL INFLOW TURBINE INVESTIGATION
C. LINDER, Signal Companies Incorporated, Airesearch Mfg Co, *402 S. 36th St., Phoenix, Arizona* 85034 (DA0P3489; DAAK30 77 C 0093)

The objective of this project is to define and demonstrate the aerodynamic feasibility of utilizing a single stage, radial inflow turbine in an advanced engine for a potential decrease in size, increased simplicity and reduced cost.

The approach will be the design of a single, advanced design radial inflow turbine stage that will replace multiple, axial stages in a single spool gas generator engine and increase cycle efficiency.

SUPPORTED BY U.S. Dept. of Defense, Tank Automotive Research & Development Command, Propulsion Systems Div.

4.0003, FLUIDIC FLEX VALVE FOR RAMJET FUEL CONTROL
D.J. SCHAFFER, Signal Companies Incorporated, Airesearch Mfg Co, *402 S. 36th St., Phoenix, Arizona* 85034 (DN881345; N62269-77-R-0352)

The basic objectives of this effort are to develop the analytical design criteria for flex duct valves for high fluid flow applications in general, and to conduct a practical demonstration of a flex duct valve for a 10,000 point per hour range ramjet fuel control. This contract supports work unit PH103, Agency Accession No. DN 833162.

Analysis associated with a 500 pound-per-hour fuel metering valve indicated that the receiver rather than the nozzle should be the flexible member in the valve. This analysis will be reviewed again to determine the suitability of this approach for general application. In addition, the following parameters affecting valve design will be studied: duct aspect ratio, recovery nozzle design, flow forces, and leakage.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

4.0004, COMPOUND CYCLE TURBOFAN ENGINE INVESTIGATION
F.B. WALLACE, Signal Companies Incorporated, Airesearch Mfg Co, *402 S. 36th St., Phoenix, Arizona* 85034 (DF461990; F33657-77-C-0391)

The objective of this program is to define the risk areas which must be addressed in the design and construction of a highly super-charged diesel turbocompound turbofan engine and to demonstrate risk reduction of critical areas through testing of rig hardware.

The early part of the program will be a comprehensive study to define risk areas, potential solutions and options and payoffs for the design and use of a turbocompound engine in an RPV. If study results are favorable, the effort will proceed into the demonstration phase by designing, building, and testing subcomponent hardware. If these subcomponent tests are successful, the hardware for a major risk engine component will be designed, built and tested.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

4.0005, HYPERSONIC HEAT TRANSFER MEASUREMENTS
B. RICHARDS, Von Karman Inst. for Fl. Dyn., *72 Chaussee de Waterloo, Brussels, Belgium* 1640 (DF051160; AF-AFOSR-3474-78)

AF function - aerospace vehicles. Deficiency - unpredicted or poorly predicted transition from laminar to turbulent flow on the nose tips of ABRES shapes has caused numerous severe problems of heating and aerodynamic instability. Ground based flow facilities do not simulate all of the flow parameters of free flight that influences these phenomena. One facility, which is rather economical to operate, located at the VKI, is capable of simultaneous simulation of Mach number and Reynolds number of these flights, while not achieving the sustained, realistic running time. Nevertheless, heat transfer and pressure distribution measurements on a number of nose tip shapes of interest to ABRES appears to be desirable. Objective - to extend and confirm data previously obtained by VKI with AVCO support and coordination, using models manufactured under a previous program. How work contributes - the results of this experimental program will help with the design of nose tips which ameliorate the problem attended to under deficiency.

The longshot facility of the VKI will be used for this program. Surface pressure and heat transfer measurements will be made at Mach numbers of 15 and 20 and free stream Reynolds numbers between 2 and 8 million per foot. Models to be tested include a concave biconic nose tip model with and without roughness.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0006, DEVELOP A COLOR ALPHA-NUMERIC LIQUID CRYSTAL DISPLAY
P. DUPUIS, Hughes Aircraft Company, Aerospace Group, *Centinela Ave. & Teale St., Culver City, California* 90230 (DN881386; N62269-77-C-0477)

The Navy's advanced integrated display system (AIDS) program is to develop a totally new concept in modular cockpit instrumentation for naval air missions, requiring exploratory development of new display materials and techniques. A flat panel display with color features is directly applicable to the type of display required by AIDS for the master monitor display and the programmable panel display. This contract supports work unit ZA601, Agency Accession No. 681080.

A liquid crystal matrix display, currently being developed by the contractor, will be combined with a multicolor filter to produce a display module displaying alpha numerics and sym-

bology in multicolor. Drive circuits are to be designed and fabricated for this matrix display, operating from an existing symbol generator.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

4.0007, DETERMINATION OF AEOLIAN SURFACE MATERIAL FLUX RATES ON EARTH AND MARS
B.R. WHITE, Univ. of California, Graduate School, *Davis, California* 95616 (NCA 2-180804)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0008, EXPERIMENTAL MEASUREMENTS OF UNSTEADY TURBULENT MIXING PHENOMENA ASSOCIATED WITH AERONAUTICAL SYSTEMS
C.M. HO, Univ. of Southern California, School of Engineering, Aerospace Engineering, *3551 University Ave., Los Angeles, California* 90007 (DN775391; N00014-77-C-0314)

Turbulent mixing phenomena play a central role in many fluid dynamic applications ranging from the flow at the trailing edge of a wind to the flow in a chemical laser. The proposed research will examine, experimentally, the mixing between two co-flowing jets in which periodic oscillations will be introduced.

In recent years significant progress has been made in the interpretation of the nature of the turbulent mixing of two, steady, planar, co-flowing jets. The planned experimental work will extend this understanding to the unsteady case and, hopefully, will iliuminate, for example, the nature of the unsteady flow at the trailing edge of an oscillating airfoil. The experiments will be conducted, initially, in water for visualization purposes, and subsequently, in air where detailed turbulence measurements will be made. The periodic disturbances will be introduced by oscillating vanes in the settling chambers upstream of the co-flowing jets.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0009, VPE GROWTH III-V STRUCTURES
UNKNOWN, Hewlett Packard Company, *1501 Page Mill Rd., Palo Alto, California* 94304 (DF903150; F19628-77-C-0199)

AF function - integrated optics for communications systems. Deficiency or opportunity - GaAs-AlGaAs epitaxial structures for integrated optics devices are being grown exclusively by liquid phase epitaxial techniques. Problems involving consistent surface morphology, and reproducibility have slowed progress, and scaling up has not been demonstrated. How research contributes - vapor phase epitaxial processes have demonstrated an ability to produce layers with superior morphology and in the case of LED production have been scaled successfully. The ability to deposit AlGaAs and high purity GaAs layers by using organometallics in a vapor phase system has been shown. Successful application of this technique to the fabrication of integrated optics devices could eliminate the present deficiencies of liquid phase preparation techniques.

A vapor phase deposition process using organometallic compounds will be investigated, studied, and developed to produce GaAs-AlGaAs device structures for use as components in integrated optics systems.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0010, RADIOGRAPHIC APPLICATION OF SPATIAL FREQUENCY MULTIPLEXING
UNKNOWN, Stanford University, Graduate School, *Palo Alto, California* 94305 (NAS 5-25043)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0011, DEVELOPMENT OF DIGITION IMAGE TUBES
E.A. BEAVER, Univ. of California, Graduate School, *P.O. Box 109, San Diego, California* 92037 (NAS 5-25054)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0012, THREE-DIMENSIONAL THERMAL POLLUTION MATHEMATHICAL MODEL
S.S. LEE, Univ. of Miami, School of Engin. & Env. Design, Mech Engin, *Miami, Florida* 33124 (NAS10-9410)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0013, FLUIDIC SEQUENCING OF BALLISTIC SYSTEMS
R.K. BRODERSEN, Martin Marietta Corporation, Aerospace Corporation, *P.O. Box 5837, Orlando, Florida* 32805 (DN896205; N00174-78-C-0094)

To evaluate/demonstrate the feasibility of utilizing fluidics to obtain longer installed life and improved accuracy and reliability in the sequencing of ballistic systems. This effort is being performed under work unit 5786A, Agency Accession No. DN696206.

This work unit encompasses the development of a fluidic sequencer (FS) and FCI/FS interface device (ID). Fluidic sequencer (FS) - the FY 78 FS effort will include: (1) demonstration of FS functioning with a plus or minus 2-3% accuracy goal over the operational temperature range (minus 65 F to plus 200 F) and supply pressure (plus or minus 15% variation) ranges. This will include final oscillator/counter interface optimization. (2) An environmental module will be designed and fabricated to encapsulate the fluidic circuits. A sonic orifice will be used to exhaust FS gases and provide consistent functioning under all conditions including the altitude environment. (3) The FS/ID/module combination will be tested across the temperature range and in a simulated altitude environment to demonstrate a plus or minus 2-3% timing accuracy. Interface device (ID) - design and fabrication of the FS output amplification device will be completed in early FY 78. Completion of ID integration into the FS module will be accomplished by the middle of FY 78. Reliability and subsystem performance tests will be conducted during the first quarter of FY 79.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Ordnance Station

4.0014, FIBER OPTICS PULSE DISPERSION STUDY
S.M. RIAD, State University of Fla. Sys., Graduate School, *P.O. Box 25000, Orlando, Florida* 32816 (NAS10-9455)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0015, DEVELOPMENT OF LOW-LEVEL DAYTIME CIG FOR FLIGHT TRAINING
J.L. BOOKER, U.S. Navy, Training Equipment Center, *Orlando, Florida* 32813 (DN894006)

Continuing review of hardware technology for CIG, development of new architectural approaches, development of new methods of data base programming, and developing applications of CIG technology in training simulations in new areas such as submarine periscope navigation and helicopter nap-of-the-earth flight modes.

The following major tasks will be implemented: (1) continuing review of CIG hardware technology; (2) development of new CIG architectural approaches; (3) develop trial environments for nap-of-the-earth flight missions and submarine periscope navigation simulators.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Training Equipment Center

4.0016, SUPERCRITICAL AIRFOIL FOR AXIAL FLOW COMPRESSORS
UNKNOWN, United Technologies Corp., Pratt & Whitney Aircraft Group, *P.O. Box 2691, West Palm Beach, Florida* 33402 (DN890034; N00019-77-C-0546)

Conduct an investigation on supercritical airfoil for axial flow compressors.

Use the advanced transonic airfoil design procedure to design a cascade representative of a section of a transonic compressor with supercritical airfoil vanes. Procure and fabricate the supercritical airfoil cascade. Test the supercritical airfoil cascade at the DFVLR wind-tunnel facilities in Port-Wahn, West Germany. Analyze test data.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0017, HOLOGRAPHIC DATA STORAGE CRYSTALS EXPERIMENT FOR THE LONG DURATION EXPOSURE FACILITY (LDEF) PHASES I AND II
T.K. GAYLORD, Georgia Inst. of Technology, School of Engineering, Electrical Engin, *225 North Ave. N.W., Atlanta, Georgia* 30332 (NAS 1-15370)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0018, HIGH CAPACITY LASER HOLOGRAPHIC DATA STORAGE
T.K. GAYLORD, Georgia Inst. of Technology, School of Electrical Engin., *225 North Ave. N.W., Atlanta, Georgia* 30332 (ENG76-81707)

A research project will be undertaken to obtain detailed understanding of optically and electrically induced refractive index changes in electrooptic crystals. Particular emphasis will be directed toward the implementation of high capacity holographic information storage and retrieval and optical grating devices. A comparison will be made of the terminal characteristics of volume hologram gratings predicted by dynamic theory and experimental results in electrooptic crystals. Several holographic data storage experiments will be conducted including volume superposition of data, coherent selective erasure, digital logic operations, optical noise, and multiphoton recording.

This action renews the research that is being conducted under NSF Grant ENG75-14456.

SUPPORTED BY U.S. National Science Foundation, Div. of Engineering

4.0019, BEHAVIOR OF ADVANCED COMPOSITE ISOGRID STRUCTURES
L.W. REHFIELD, Georgia Inst. of Technology, School of Engineering, Aerospace Engineering, *225 North Ave. N.W., Atlanta, Georgia* 30332 (DF047510; F49620-77-C-0077)

AF function - advanced aerospace flight structures are required which have higher performance and increased durability. Opportunity -advanced composite materials and new manufacturing methods can provide improved performance, lower-cost primary structure. Objective -objective of this research is to experimentally examine the behavior of composite isogrid structures and compare data with state-of-the-art theoretical predictions. How work contributes - this research contributes to the Air Force research and development program to exploit the potential of advanced composite primary structure.

Advanced composite isogrid cylindrical shells and wide column structural specimens will experimentally be investigated to determine critical buckling loads, global buckling modes, local buckling modes and assess imperfection sensitivities. Experimental data will be compared with theoretical predictions of buckling behavior in order to assess adequacy of current theoretical approaches. Subsequent to buckling studies experiments are planned to investigate vibrational behavior of the isogrid specimens.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0020, OPTICAL TECHNIQUES TO MEASURE DISPLACEMENTS AND STRAINS IN SOLIDS
C.A. SCIAMMARELLA, Illinois Inst. of Technology, School of Engin. & Phys. Sci., Mech & Mechanical & Aerosp Eng, *3300 S. Federal St., Chicago, Illinois* 60616 (ENG77-24302)

The objective of this research program is to develop optical techniques (holography, moire and speckle interferometry) for the measurement of stresses and strains in solids.

These developments include faster and more efficient data processing techniques, significant increase in the magnitude of resolution, easier and simpler methods of application, and possible new areas of utilization.

These advances will find application in a number of areas of technological importance, such as the study of complex structural and machine elements, in the study of material properties, as well as in nondestructive inspection techniques and fracture mechanics.

This action provides additional support for ENG 75-11160.

SUPPORTED BY U.S. National Science Foundation, Div. of Engineering

4.0021, SPACELAB EXPERIMENT DEFINITION RELATING TO BASIC SOIL BEHAVIOR AND DYNAMIC PROPERTIES
M.L. SILVER, Univ. of Illinois, School of Engineering, Materials Engineering, *Box 4348, Chicago, Illinois* 60680 (NAS 8-32993)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0022, STUDY OF ANTENNA DIFFRACTION PROBLEMS
R. MITTRA, Univ. of Illinois, School of Engineering, Electrical Engin, *2527 Hydrosystems Lab., Urbana, Illinois* 61801 (NAS 5-25062)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0023, ANALYSIS OF FLOWS WITH SHOCKS
D.A. ANDERSON, Iowa State Univ. of Sc. & Tech, School of Engineering, Aerospace Engineering, *496 Town Engineering Bldg., Ames, Iowa* 50011 (NSG 1535)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0024, DEVELOPMENT OF SOFTWARE FOR SPECTRAL IMAGE PROCESSING
A. ROSENFELD, Univ. of Maryland, School of Engineering, Computer Sci, *College Park, Maryland* 20740 (NCA 5-27)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0025, TURBULENT BOUNDARY LAYER CALCULATIONS
B. WEINBERG, U.S. Navy, Surface Weapons Center, *Silver Spring, Maryland* 20910 (DN785080)

The effort will be aimed at developing efficient, cost-effective computational techniques for the solution of the boundary layer, boundary region and Navier-Stokes equations in two and three space dimensions. Such methods are necessary to accurately predict the effects of viscous forces on aircraft and missile performance, heating rates, skin friction distributions and zones of separation. Furthermore, they can be used as design tools for Navy vehicles such as reeentry and cruise missiles.

Since the governing viscous flow equations are parabolic in nature or can be cast into parabolic form, finite-difference matching techniques will be employed. However, the novelty in the proposed method will be the use of the fourth-order operator

compact implicit scheme, developed at NSWC/WOL, to accomplish the spatial differencing.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Sea Systems Command

4.0026, NAVIGATION - ATOMIC OSCILLATORS
N.F. RAMSEY, Harvard University, School of Arts & Sciences, Physics, *16 Divinity Ave., Cambridge, Massachusetts* 02138 (DN624041; N00014-76-C-0031)

This is a study in atomic processes and devices leading to extreme precision in measurement and use of frequency and time standards. Advances in such standards enable Navy to fulfill its prime responsibility to the Department of Defense in providing time and frequency services and lead to improved capabilities in navigation, IFF and air traffic control systems.

This investigation focuses on energy level linewidth broadening in hydrogen, caused by impact of atoms of this gas on the walls of resonant cavities in which oscillations are sustained. This 'wall-broadening' results in radiation of varying frequencies emitted as jumps occur from the varying possible positions of wide energy levels. Accordingly, precision and resetability of masers which employ hydrogen gas is a function of this wall-broadening. Modifications will be made on a large storage box maser with a deformable bulb. The deformable bulb technique allows for very accurate wall shift measurements.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0027, STUDY FOR EXTRATERRESTRIAL PROCESSING AND MANUFACTURING OF LARGE SPACE SYSTEMS
R.H. MILLER, Mass. Inst. of Technology, School of Engineering, Aeronautics & Astronautics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (NAS 8-32925)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0028, EXPERIMENTAL STUDIES OF FLIGHT PERFORMANCE OF GLIDING PARACHUTES
W. NYKVIST, U.S. Army, Natick Research & Dev. Command, *Natick, Massachusetts* 01760 (DA0H4257)

To obtain in-flight aerodynamic performance data to confirm/refine key parameters used in six-degree-of-freedom (6-DOF) computer simulation. To procure and test selected guidance and control systems used to guide a cargo-carrying gliding parachute to a specific landing area.

Design and fabricate a gliding parachute flight data recording system using existing ASN-95 transmitter and receiver. Continuously record up to 14 variables while guiding the parachute through specific maneuvers. Use data to adjust and refine assumptions used in 6-DOF computer program. Use testing experience and computer simulation to choose specific guidance and control system for procurement and test prior to engineering development.

SUPPORTED BY U.S. Dept. of Defense, Army, Natick Research & Development Command

4.0029, DESIGN MODEL OF EXHAUST PORT HEAT REJECTION IN A DIESEL ENGINE
R.E. MCCLELLAND, U.S. Army, Propulsion Systems Division, *Warren, Michigan* 48090 (DA0N3507)

Develop a design model of heat transfer to the coolant of a water cooled reciprocating engine capable of predicting changes in heat rejection from the port as a result of configuration and material changes in port design.

The exhaust port of the diesel engine will be modeled by an equivalent round pipe. Pulsating gas flow approximations will be used in a two-dimensional system. Changes in heat transfer characteristics for conduction and convection will be inputs to the model along with geometry and gas flow mass and temperature profile. Verification will be made initially on a single cylinder CFR engine and expanded to a multicylinder engine.

SUPPORTED BY U.S. Dept. of Defense, Tank Automotive Research & Development Command, Tank Automotive Concepts Lab.

4.0030, ROCKET STUDY OF AURORAL PROCESSES
L.J. CAHILL, Univ. of Minnesota, School of Liberal Arts, Physics, *322 Johnston Hall, Minneapolis, Minnesota* 55455 (NSG 6021)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0031, EVALUATION OF EMS TELEMETRY CAPABILITY IN REMOTE AREAS USING SYNCHRONOUS SATELLITE COMMUNICATIONS TECHNOLOGY
W.G. BRUNDAGE, Univ. of Southern Mississippi, School of Science & Technology, Medical Technology, *Hattiesburg, Mississippi* 39401 (NAS13-95)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0032, DEVELOP A COMPUTER PROGRAM TO COMPUTE THE FLOW FIELD, AERODYNAMIC FORCES AND HEATING RATE ON ARBITRARY SHAPED BODIES
J.F. THOMPSON, Mississippi St. University, School of Engineering, Aerophysics & Aerospace Engin, *Suite 101 Engineering Bldg., Mississippi State, Mississippi* 39762 (NAS 8-32912)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0033, INVESTIGATION OF NUCLEATE BOILING IN NORMAL AND REDUCED GRAVITY ENVIRONMENTS
J.B. MILES, Univ. of Missouri, School of Engineering, Mech & Aerospace Eng, *103 Engineering, Columbia, Missouri* 65201 (NCA 2-450802)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0034, REMOTE SENSING SYSTEM FOR EXHAUST GAS EMISSION MEASUREMENT (HYDROCARBONS)
A.F. KLARMAN, U.S. Navy, Air Propulsion Test Center, *Trenton, New Jersey* 08641 (DN796897)

To evaluate and/or develop new equipment using remote sensing principles for the measurement of hydrocarbon pollutants emitted from exhaust stacks and gas turbine engines.

Review the present state-of-the-art for remote sensing instrumentation and select the most promising analytical principles for development for use in a jet engine test cell environment. This work unit will have its major emphasis on unburned hydrocarbons. It will compare the flame ionization detector method with low-, medium-, and high-resolution IR-spectrophotometry in the three to four wave number region by conducting a series of well-controlled experiments using combustion sources and exhaust gas mixtures of increasing complexity.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Material Command

4.0035, STUDIES OF ROLLER INSTABILITY IN ROLLER BEARINGS 14445-E
P. GUPTA, Mechanical Technology Inc., *968 Albany-shaker Rd., Latham, New York* 12110 (DA0F8957; DAAG29 77 C 0014)

To study the causes of the key vibrational frequencies in roller bearings. Relevance - this research is particularly important in designs for transmissions and helicopter turboshaft engines.

From the dynamical equations of motion and specified initial conditions, real-time simulation of the roller motion will be found along with orbits and various interactions amongst the different elements in the roller bearing.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0036, ELECTROOPTICAL MODELLING ANALYSIS
B. BENDOW, U.S. Air Force, Rome Air Development Ctr., *Griffiss Air Force Base, Rome, New York* 13440 (DF902730)

AF function - development of high-bandwidth, lightweight, low-cost, compact, low crosstalk communications capabilities, ground-to-ground and within aircraft. Deficiency - current communications media and equipment are, or are quickly becoming, expensive, cumbersome, overburdened, and subject to crosstalk and interference. Objective -design of components and configurations for communications via optical fibers, and investigations of factors influencing the suitability and performance for optical wave communications. How research contributes -aids the implementation of optical communications by determining the optical configurations for undistorted propagation, coupling, and/or switching, and by identifying the relation between device performance and the design of various optical components and configurations.

Develop mathematical techniques for solving electromagnetic wave equation in arbitrary cross sectional geometrics, and methods for implementing computer solutions. Apply these methods to problems of propagation and coupling for proposed system configurations.

ADDENDA: Supporting agency address is: Rome Air Development Center ETS, Griffiss AFB, N Y 13440

SUPPORTED BY U.S. Dept. of Defense, Air Force

4.0037, RADC POST-DOCTORAL PROGRAM C&E SYSTEMS SYRACUSE UNIVERSITY
UNKNOWN, Syracuse University, Graduate School, *Steele Hall, Syracuse, New York* 13210 (DF916060; F30602-75-C-0121)

The objective of this effort is to determine the feasibility of generating three-dimensional images of distant space objects using one-dimensional photometric satellite signatures.

By computing the corresponding cross-sectional area associated with light intensity reflected from unknown space objects, and by calculating dynamic object orientation as a function of time, it may be possible to graphically construct an image of an object.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0038, LOW SIDELOBE LEVEL LOW-COST EARTH STATION ANTENNAS FOR THE TWELVE GHZ BROADCASTING SATELLITE SERVICE
R.E. COLLIN, Case Western Reserve Univ., School of Engineering, Electrical Engin & Appl Phy, *University Cir., Cleveland, Ohio* 44106 (NAS 3-21365)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0039, STATISTICS OF SPECKLE PROPAGATION
R. KERR, Oregon Grad. Ctr., Graduate School, *19600 N.W. Walker Rd., Beaverton, Oregon* 97005 (DF742410; F30602-78-C-0064)

To reduce the impact of backscatter phenomenology on extended performance active sensors by (a) extending the knowledge of such phenomenology, and (b) by completing the development and validation of theory predicting such phenomena in order to promote the development of useful solutions to this problem other than limited computer simulation studies pursued currently by the technical community. Air Force mission requirements in space surveillance and defense involving ultra-precision target position determination, target discrimination and identification, exceed current capabilities of ground-based sensors and passive space-based surveillance systems. Active sensors employing adaptive optical techniques potentially can meet these requirements, and thus promote these Air Force functions. Active sensors, which meet ultra-precision and resolution requirements in support of AF surveillance missions, are performance-sensitive to target backscatter phenomena. Resulting limitations in performance fall short of potential capabilities, leaving little resulting enhancement over near term extensions of current sensor capabilities.

Statistical modeling of target backscatter shall be developed predicting the behavior of return field properties as a function of target and atmospheric factors which drive sensor measurements in a spatial and temporal manner. This modeling shall be validated by experimental data for a number of numerically solvable limiting cases.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0040, MATERIAL SUPPORT TECHNOLOGY - STUDIES OF SEMICONDUCTOR HETEROJUNCTIONS
S.J. OWEN, Oregon State Higher Educ. Sys., School of Engineering, Electrical & Computer Engin, *200 Covell Hall, Corvallis, Oregon* 97331 (DN875025; N00014-77-C-0608)

Future Navy systems for communications, surveillance, and navigation will make use of new types of electron and optical devices. advanced material developments will require understanding of heterojunction device operation for electron and optical devices made from compound and elemental semiconductors.

Using up-to-date liquid phase epitaxial growth techniques, heterojunctions between gallium arsenide and germanium will be prepared. The chemical, structural, optical and electrical properties of these junctions will be determined using a broad spectrum of analysis techniques. From these measurements and correlations the effects of interface thickness, growth temperature, junction doping, interface states on the transport properties of the junctions will be determined. These results will be compared with theoretical models recently developed for these structures. At a later time studies will be made of the heterojunction between gallium-indium-arsenide and germanium as a function of the gallium-to-indium ratio.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0041, SURVEILLANCE - TWO-PHOTON ABSORPTION AND AMPLIFICATION IN GASES
L.M. NARDUCCI, Drexel University, School of Science, Physics & Atmospheric Science, *32nd & Chestnut Sts., Philadelphia, Pennsylvania* 19104 (DN775007; N00014-76-C-1082)

The Navy requires an improved understanding of potentially new types of lasers. This effort will address the requirements for producing lasers operating on two-photon transitions.

This effort will address three aspects of two-photon lasers: (1) the identification of an appropriate pumping scheme for producing an inversion between two levels of identical parity; (2) the observation of stimulated two-photon emission between atomic levels of the same parity; (3) an analysis of the potentially large number of competing processes whose end result will be the depletion of the useful population inversion between the two relevant levels. In particular, experimental studies will be carried out on atomic calcium. Calcium is somewhat unique in that the lowest excited states are metastable with respect to decay to the ground state. Calcium will be optically pumped from the singlet S(0) ground state to the singlet D(2) excited state through the higher 5 singlet P(1) and two-photon stimulated emission will be investigated from the singlet D(2) to the singlet S(0) transition at 4575 angstroms using a 9150 angstrom dye laser.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0042, A PRELIMINARY THERMAL ANALYSIS OF RECIPROCATING SEALS FOR THE STIRLING ENGINE
W.F. HUGHES, Carnegie Mellon University, School of Engineering, Mech Engin, *Frew Ave. & Margaret Morrison, Pittsburgh, Pennsylvania* 15213 (NSG 3202)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0043, STUDY APPLICATION OF WEAR THEORY
M.J. DEVINE, U.S. Navy, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974 (DN881132)

Provide on-site technology applications for improved wear control/reduction encompassing aircraft hinges, tools, and splines proposed by the 'delamination theory of wear'. This will also include the analysis of laboratory and field results to determine the scope and limits for the application of this theory.

Define and initiate the support programs for specific field tests of aircraft components to further clarify the delamination theory for wear control. In cooperation with Massachusetts Institute of Technology and Foxboro/Trans-Sonics, Inc., review the specific components including design, hardness, and specimen number to be processed for in-service wear studies including inspection intervals, depth of inspection and the appropriate analytical technique including the application of ferrography. Specific areas to be included in the service studies are cutting tools, aircraft splines, and aircraft hinges. The support will provide the utilization of specialized laboratory equipment, e.g., aircraft spline test apparatus and aircraft hinge test. The data base already established for splines, tools, and other components will be made available to determine high failure rate elements and enable the necessary comparison of improvement imparted by new wear technology based on delamination theory.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0044, ACCURACY ANALYSIS OF POINTING CONTROL SYSTEM OF SOLAR POWER STATION
J.C. HUNG, Univ. of Tennessee, School of Engineering, Electrical Engin, *W. Cumberland Ave. S.W., Knoxville, Tennessee* 37916 (NAS 8-33065)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0045, FLOW VISUALIZATION STUDY OF SECONDARY FLOW IN A CORNER
F.G. COLLINS, Univ. of Tennessee, Space Institute, *Tullahoma, Tennessee* 37388 (DF051520; AF-AFOSR-3537-78)

AF function - advanced aerospace vehicles. Opportunity - to develop methods for modeling the interfering flow which occurs at the wing-fuselage juncture of an aircraft. Providing more accurate drag prediction, such a method would lead to the design of more aerodynamically efficient aircraft. Objective - to study by means of flow visualization in a water tunnel the secondary flow which occurs in a corner region. How work contributes - will increase the level of understanding of the fluid mechanics associated with flows in corners. In particular, will concentrate on the structure and properties of the corner vortices in laminar and transitional flow.

The flow in the sharp 90 degree corner formed by intersecting flat plates will be studied during a water tunnel test, primarily by means of flow visualization. Data for determining skin friction and velocity profiles in the flow field will be collected. The range of Reynolds number in the test will encompass laminar and transitional flows.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0046, ANALYSIS OF A PORTABLE LUNAR RANGING TELESCOPE MOUNT
L.L. HOBEROCK, Univ. of Texas, School of Engineering, Mech Engin, *200 W. 21st, Austin, Texas* 78712

DESCRIPTION: A proposed lightweight mount for a lunar laser ranging telescope consists of a horseshoe-shaped beam with an open-box cross section. This research seeks to determine deflection characteristics of the mount by analytical means to correlate with measurements taken on a scale model of the mount.

SUPPORTED BY University of Texas

4.0047, SAW RESONATORS
W.R. SHREVE, Texas Instruments Incorporated, *13500 N. Central Expy., Dallas, Texas* 75222 (DN680329; N0004-75-C-0824)

There is a need for improved secure and covert communications systems for applications ranging from voice communications to remotely piloted vehicles. The objective of this program is to develop advanced state-of-the-art VHF and UHF signal processing components for communications systems under development.

High q filters will be developed for the VHF and UHF bands using saw resonators. Basic limitations of these devices will be identified and overcome so far as is practical or is required for systems applications.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

4.0048, STUDY FOR THE ELECTROSTATIC PROTECTION OF THE SOLAR POWER SATELLITE AND RECTENNA
A.A. FEW, Rice University, School of Engineering, Environmental Sciences & Engin, *6100 Main St., Houston, Texas* 77001 (NAS 8-33023)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0049, ADVANCED SYMBOLOGY GENERATOR (ASG)
D. GARNER, Evans & Sutherland Comp. Corp., *3 Research Rd., Salt Lake City, Utah* 84112 (DF323190; F33615-77-C-0531)

To specify, configure, and fabricate a dynamic interactive computer graphics display system. This system will provide the capability for developing, generating, and displaying advanced symbology presentations in a laboratory environment on helmet-mounted displays which are a subsystem of the visually coupled airborne system simulator (VCASS) system.

The multiple requirements of the visually coupled airborne systems simulator (VCASS) involve the design, development and evaluation of a self-contained, ground/airborne, man-in-the-loop visual/display simulator. This simulator will be used to perform the man-machine interface design and engineering of cockpit control/display subsystems for advanced technology aircraft and for solving deficiencies in existing visual scene simulation techniques. To meet these requirements an advanced symbology generator becomes a critical subcomponent of VCASS. Key design goals include configuring the ASG system with the flexibility needed to allow the user to construct and iterate a wide range of symbology presentations to thoroughly test the VCS/scene dynamics interfaces and to design the appropriate interfaces between the ASG and helmet-mounted display (HMD) that will permit the ASG to utilize the maximum capability of the HMD. The program is divided into three phases. The first (design) phase will determine ASG system configuration and approach to the ASG/HMD interface design. The second (fabrication) phase will result in the building of the ASG as well as the final design and build of two separate HMD interface units. The third (engineering support) phase will provide maintenance support and consultation or system use and interface to other VCASS equipment.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Labs.

4.0050, DISTRIBUTED SURFACE CONTROL FOR LARGE SPACE SYSTEMS
H.F. VANLANDINGHAM, Virginia Poly. Inst. & St. U., School of Engineering, Electrical Engin, *Burruss Hall, Blacksburg, Virginia* 24061 (NSG 1527)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0051, HIGH-SPEED ROTOR BALANCING 15080-E
W.D. PILKEY, Univ. of Virginia, School of Engin. & Appl. Sci., Aerospace Engineering, *Garrett Hall, Charlottesville, Virginia* 22903 (DA0F9129; DAAG29-78-G-0019)

To investigate new techniques for balancing, analyzing, and designing flexible rotating shafts. Relevance - this research is particularly important for balancing rotors and shafting of helicopters as well as for high-speed turboshaft engines.

Analytical and numerical methods will be used and experimental measurements will be made to get accurate values for the unbalanced inertial forces. The difference between measured and computed responses will be minimized.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0052, HT PP 78-08 - HIP DISK COOLING PROGRAM
J. LANE, U.S. Army, Applied Technology Laboratory, *Fort Eustis, Newport News, Virginia* 23604 (DA0E3811)

The objective of this effort is to evaluate the heat transfer characteristics of various quench media analytically to permit assessment of expected material property variations and provide for capability to analytically heat treat a turbine disk.

The effort utilizes measured heat transfer data obtained through existing contract from MM & T and models the data with a conduction heat transfer program to obtain effective heat transfer coefficients. These heat transfer coefficients are used to analytically heat a turbine disk and obtain expected property levels and property variation within the disk.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

4.0053, STUDY OF HIGH-SPEED COMPLEX NUMBER ALGORITHMS
R. HEISLER, Walla Walla College, Graduate School, Engineering, *College Place, Washington* 99324 (NAS 5-25063)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

4.0054, TRANSONIC VEHICLE DESIGN - THEORETICAL STUDIES OF TRANSONIC FAR-FIELD AND NEAR-FIELD MATCHING
P.E. RUBBERT, Boeing Company, Commercial Airplane Group, *7555 E. Marginal Way South, Seattle, Washington* 98108 (DN675586; N00014-76-C-0931)

The development of accurate methods for predicting the transonic flow field about complex naval aircraft and missiles is essential for their design and optimization. The proposed research will explore new methods for matching analytical far fields with numerical near fields to describe the inviscid flow about complex configurations.

In the computation of transonic flow fields about bodies by numerical means, the calculation region must be finite and limited to extent, yet the field of interest is usually infinite. If coordinate transformations are not convenient, such as in complex three-dimensional flows, or if the size of the numerical field must be restricted because of the magnitude of the computations, a common procedure has been to match a numerical near field calculation to an analytical far field. The closer the matching contour the greater the savings in computation. The proposed research will examine matching in which continuity of both the velocity potential and its normal derivative are preserved as well as the use of higher order far field solutions.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0055, STIRLING ENGINE DESIGN MANUAL
W.R. MARTINI, Univ. of Washington, School of Engineering, Chemical Engin, *206 Guggenheim Hall, Seattle, Washington* 98105 (NSG 3194)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production and Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, EROSION OF BASALT MINERALS AND ROCKS UNDER SIMULATED MARTIAN AEOLIAN CONDITIONS
D. KRINSLEY, Arizona State University, School of Liberal Arts, Geology, *Tempe, Arizona* 85281 (NCA 2-35801)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0002, PHYSIOGRAPHIC CLASSIFICATION OF SOUTHERN PINE FOREST LANDS
P.E. POPE, Univ. of Arkansas, Agric. Experiment Station, Horticulture & Forestry, *Fayetteville, Arkansas* 72701 (0061232; ARK00759)

OBJECTIVE: Organize physiographic land patterns into a system having a significance and utility for resource managers. Develop a physiographic map of southern region using the new system.

APPROACH: Current information on physiography, soils, and surface geology related to forest vegetation will be analyzed and coordinated. Localized information will be reorganized to form a unified regional system. Map development will be on a state basis, utilizing local authorities, aerial photography, and space imagery when appropriate.

PROGRESS: In this regional project the Arkansas Agricultural Experiment Station is responsible for the compilation of information regarding soil, geology, and forest vegetation for the state of Arkansas. ERTS satellite images have been assembled for the state and differing physiographic land forms have been delineated. Information relating soil type to these physiographic delineations has been obtained from an Arkansas state soils map. Similarily, geologic information has been compiled from a geologic map of Arkansas. The description of forest vegetation by physiologic delineation is now in progress.

SUPPORTED BY U.S. Dept. of Agriculture, Cooperative State Research Service, Arkansas

5.0003, VIKING ORBITER
M.H. CARR, U.S. Dept. of The Interior, Geological Survey, Geologic Division, *345 Middlefield Rd., Menlo Park, California* 94025 (9580-00760)

The Viking Orbiters will continue to acquire pictures of the Martian surface throughout the entire fiscal year. This project supports that activity in two areas, first in the planning and acquisition of new data, and second in interpretation of the data. During the year we will systematically photograph the entire planet at approximately 200 m resolution in color, photograph the entire planet in three colors at approximately 500 m resolution, and sample other areas at resolution that range down to 8 m. These data will provide the basic data for Mars studies for the next ten years. Interpretative studies will focus on the meaning of observed color variations on the surface, the history of volatiles and volcanic processes.

SUPPORTED BY U.S. Dept. of the Interior, Geological Survey, Geologic Div.

5.0004, LUNAR CHRONOLOGY
D.E. WILHELMS, U.S. Dept. of The Interior, Geological Survey, Geologic Division, *345 Middlefield Rd., Menlo Park, California* 94025 (9580-01575)

To conclude assemblage of data on relative ages of lunar maria, light plains, craters, and basins, and to construct a detailed stratigraphic column of all dated geologic units, with the ultimate

objective of specifying in detail the impact and igneous history of the Moon.

SUPPORTED BY U.S. Dept. of the Interior, Geological Survey, Geologic Div.

5.0005, SOIL MOISTURE IN RELATION TO GEOLOGIC STRUCTURE AND LITHOLOGY IN NORTHERN CALIFORNIA

E.I. RICH, Stanford University, School of Earth Sciences, Earth Sciences, *Palo Alto, California* 94305 (NAS 5-24479)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0006, AIRBORNE OCEAN SURVEILLANCE AND RECONNAISSANCE TECHNOLOGY DEVELOPMENT

B. JACKSON, General Dynamics Corporation, *P.O. Box 80847, San Diego, California* 92138 (DN881225; N62269-77-ET-71546)

To continue the development and simulation of ANC (abrupt nonlinear compression) algorithms and extend the technique to include two-dimensional algorithms. To further investigate digital recording techniques with the laser line scanner. This contract supports work unit ZT701, Agency Accession No. DN781263.

Review the previous work done on one-dimensional ANC algorithms and determine the possibilities of improving the initialization procedures, reversal of relative temperature, and streaking effects. Develop two-dimensional algorithms using the same techniques used in the one-dimensional algorithm. Simulate the results using the laser line scanner and the infrared ship imagery data bank. Examine the feasibility of using the laser line scanner to recover digital data recorded on film.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

5.0007, LAKE ERIE SPECTRAL RADIANCE AND IRRADIANCE STUDY

R.W. AUSTIN, Univ. of California, Scripps Inst. of Oceanography, *P.O. Box 1529, San Diego, California* 92038 (NAS 3-21473)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0008, NAVY ENVIRONMENT - NUMERICAL MODELING OF LARGE-SCALE AIR-SEA INTERACTIONS IN THE NORTH PACIFIC

M.C. HENDERSHOTT, Univ. of California, Scripps Inst. of Oceanography, *P.O. Box 1529, San Diego, California* 92038 (DN875149; N00014-75-C-0152)

Large-scale long-term variability in the temperature structure of the upper ocean has a pronounced effect on acoustic propagation conditions and hence on our surveillance systems. The objective of this project is to develop a dynamic ocean model using numerical techniques which will simulate and forecast the sea surface temperature, transport, and surface heat balance resulting from large scale atmospheric heat flux anomalies in the North Pacific Ocean. This project is an integral part of the north Pacific Experiment (NORPAX).

Because observed atmospheric data are used to 'drive' the ocean forecasting model, it is necessary to compile, analyze, and condense appropriate information such as solar radiation, humidity, air-sea temperature differences, surface winds, etc. The ocean forecasting model itself utilizes fundamental hydrodynamic principles and is programmed for a computer. Data defining the heat flux between the ocean and atmosphere in the Northern Hemisphere will be used to test the dynamic ocean model.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0009, FOREST CLASSIFICATION AND INVENTORY SYSTEM USING LANDSAT, DIGITAL TERRAIN, AND GROUND SAMPLE DATA

A.H. STRAHLER, Univ. of California, Graduate School, *Santa Barbara, California* 93106 (NAS 9-15509)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0010, NEAR-EQUATORIAL CONVERGENCE

L.V. BATLIN, U.S. Dept. of Commerce, Environmental Research Labs., *Boulder, Colorado* 80302 (8AC44278)

PROJECT OBJECTIVE: Detailed measurements will be made by the NOAA P-3 research aircraft of the near-equatorial trough-convergence. These and the GOES satellite and commercial aircraft will be used to develop a qualitative understanding of the relations among winds, clouds, rain air, and sea temperatures and pressure, and fluctuations on the cloud, meso- and synoptic scales.

CURRENT YEAR PLAN: Obtain data of the traverses and special GOES high resolution visual and infrared pictures of the near-equatorial segment. Use data to evaluate numerical model assumptions.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Labs.

5.0011, ISOTOPE STUDIES OF UPPER MANTLE

M. TATSUMOTO, U.S. Dept. of The Interior, Geological Survey, Geologic Division, *Box 25046, Denver Federal Center, Denver, Colorado* 80225 (9740-00384)

We plan to continue lead isotopic studies of basalts and ultrabasic rocks. The whole rock and mineral study of Hawaiian basalts will be restarted with our improved techniques to investigate basalt genesis. We further plan to study U-Th-Pb, Sm-Nd, and Rb-Sr distribution among ultrabasic rocks with regard to the mantle evolution.

We plan to study U-Th-Pb systematics of terrestrial zircon by analyzing single crystals using a tandem mass spectrometer. Zircon which we plan to analyze this year for geochronology are from Precambrain gneisses of the Godthal district, West Greenland and from Japanese Islands.

U-Th-Pb systematics of Apollo 11 and 12 samples are also continued using a tandem mass spectrometer and a special chemical procedure which has been developed for sub-milligram samples.

We are studying Sm-Nd systematics of terrestrial ultrabasic rocks which are difficult to date by U-Pb, Rb-Sr, and K-Ar methods. We are currently analyzing minerals from LaPerouse layered gabbro, Glacier Bay, Alaska for Sm-Nd isotopes. We plan to study Sm-Nd systematics of materials from the Stillwater Complex, Montana.

SUPPORTED BY U.S. Dept. of the Interior, Geological Survey, Geologic Div.

5.0012, STRATOSPHERIC MOLECULAR SPECTRAL PARAMETER STUDY

A. GOLDMAN, Univ. of Denver, School of Arts & Sciences, Physics & Astronomy, *2115 S. University Blvd., Denver, Colorado* 80210 (NAS 5-25097)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0013, REMOTE SENSING TECHNIQUES TO IDENTIFY AND QUANTIFY HYDROLOGIC OPERATING PARAMETERS OF REMOTE MOUNTAIN WATERSHEDS (ABBREV)

W.D. STRIFFLER, Colorado State University, School of Natural Sciences, Earth Resources, *Fort Collins, Colorado* 80523 (B-160-COLO)

This study proposes to determine potential applications for utilizing remote sensing data in the hydrology of remote or wil-

derness watersheds. Specifically the study will be concerned with estimating hydrologic parameters in a water yield model using remote sensing data. Specific tasks in the study include: (1) Selecting an appropriate water yield model, (2) determining those parameters which may potentially be estimated from remote sensing data, (3) select two test sites and collect the available imagery, including LANDSAT, for the sites selected, (4) determine whether the parameters can be estimated within the accuracy requirements of the model (parameter sensitivity) using LANDSAT and various image analysis and pattern recognition techniques, (5) determine the scale requirements for the various parameters, and (6) test the estimated parameters in the model for the test site. The study will be conducted in collaboration with the Colorado Division of Water Resources, Dr. J.A. Danielson, Deputy State Engineer.

SUPPORTED BY U.S. Dept. of the Interior, Office of Water Research & Technology

5.0014, DEVELOP METHODS FOR MONITORING DROUGHT IMPACT FROM LANDSAT
UNKNOWN, Colorado State University, Graduate School, *Fort Collins, Colorado* 80523 (NAS 5-25081)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0015, RESEARCH PROBLEMS IN ENVIRONMENTAL PHYSIOLOGY AND ECOSYSTEM ECOLOGY
D. CHALLINOR, Smithsonian Institution, *900 Jefferson Dr. S.W., Washington, District of Columbia* 20560 (DF040710; F44620-75-C-0052)

AF function - the Air Force in its day-to-day operations, in the performance of special missions and in developing/testing new systems, interferes with the environment. Legislation directs attention to these problems including such matters as waste disposal, effects of noise and electromagnetic radiation on people and wildlife, control of bats and birds hazardous to aircraft and unfavorable influences on surrounding communities. Deficiency - ecosystem ecology aims at understanding how man's ecological systems are put together and how they work in nature. It is necessary to learn the energy flow biogeochemical cycling, species diversity, physical and biological factors that interact to regulate the structure and function of communities. Research - a framework of knowledge of local environments both in the U.S. and overseas may be developed. These will form the basis for modeling techniques that will be applicable at other installations. In addition, realistic ecological criteria need to be established in order to optimize the balance between the environment and Air Force operations. How research contributes -results from these studies are relevant to ecological aspects of diseases, to the physiology of man's adjustment to extremes of climatic conditions and supports AFSC R.O. 1.9, Environmental Quality, and AFWL requirements relative to bird/aircraft collision hazards.

ADDENDA: Supporting agency address is: AF Office of Scientific Research NL Bldg 410, Bolling AFB, DC 20332

SUPPORTED BY U.S. Dept. of Defense, Air Force

5.0016, DATA QUALITY AND MONITORING
UNKNOWN, U.S. Dept. of Commerce, Natl. Meteorological Center, *5200 Auth Rd. S.E., Washington, District of Columbia* 20023

OBJECTIVE: Monitor, study, and evaluate the various data sets currently available at NMC and prepare for the evaluation of additional data from new and exotic sources related principally to the First GARP Experiment (FGGE).

STATUS AND PLANS: (a) Data used in current operational systems have not been monitored sufficiently; thus pathological conditions may develop which remain undetected for extended periods. Plans to develop programs for automatically testing for unusual circumstances (excessively large or small data-use counts, analysis toss outs, etc.) are underway; these programs will bring these conditions to the attention of NMC personnel for immediate action. (b) In cooperation with the development of the optimum interpolation analysis system, the errors in the NIMBUS-6 satellite observation system are being computed and three-dimensional spatial correlation patterns of those errors have been found. The programs and methods are being generalized for calculation of similar statistics for all observational systems, including new ones such as ASDAR, NESS or other cloud track winds, free balloons, buoys, SEASAT, and the TIROS-N satellite observations (when they become available). (c) The international data-exchange format for FGGE data have been established. The project will assist other Divisions of NMC in implementing various programs for collecting, evaluating, and using the new data.
Part 3 of 9.

SUPPORTED BY U.S. Dept. of Commerce, National Weather Service, National Meteorological Center

5.0017, SATELLITE ULTRAVIOLET IMAGING SENSOR
G.R. CARRUTHERS, U.S. Navy, Res. Laboratory, *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN880027)

To design and develop ultraviolet imaging sensors for use in a satellite mission, having in turn the objectives of (a) determining the perturbations of the earth's near-space environment, in the middle- and far-ultraviolet wavelength ranges, due to missiles, space vehicles, and other man-made activities; and (b) determining the morphology of natural perturbations of the atmospheric/space UV background, such as auroras, tropical arcs, and celestial objects.

Develop far- and middle-UV imaging sensors based on NRL-developed electrographic Schmidt cameras, but replacing the previously used recording film with a solid-state two-dimensional array sensor, such as CCD array, providing television readout capability suitable for use in an unmanned satellite.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

5.0018, EXPERIMENTAL IMPLEMENTATION OF A LIGHTNING AND RADIO EMISSION DETECTOR
L.J. LANZEROTTI, State University of Fla. Sys., Graduate School, *Gainesville, Florida* 32601 (NAS 2-9976)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0019, NUMERICAL STUDY OF BAROCLINIC INSTABILITY
J.E. GEISLER, Univ. of Miami, School of Marine & Atm. Sci., *4600 Rickenbacker Causeway, Miami, Florida* 33149 (NAS 8-32898)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0020, STUDY OF CLOUD COVER MODELING
P.N. SOMERVILLE, State University of Fla. Sys., School of Arts & Sciences, Mathematical Sciences, *P.O. Box 25000, Orlando, Florida* 32816 (NAS 8-33071)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0021, STUDY - LOW LATITUDE WINDS FOR ORBITAL REENTRY
C.G. JUSTUS, Georgia Inst. of Technology, School of Engineering, Aerospace Engineering, *225 North Ave. N.W., Atlanta, Georgia* 30332 (NAS 8-32897)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0022, ATMOSPHERIC POLLUTION SCAVENGING
R.G. SEMONIN, State Water Survey, *Box 232, Urbana, Illinois* 61801 (006440)

Through the use of aircraft, surface instrument networks, upper air measurements, and remote sensing of storms by radar, the 3-dimensional distribution of specific aerosol species is observed and the surface wet and dry deposition is determined. The field measurements are obtained over an area of 4000 square km with well-defined boundaries for assessment of the areal source contribution to the larger regional airshed. Lead, cadmium and manganese concentrations vs. particle size distributions measured in and around St. Louis show wide variations both in concentration and the shape of the distribution curves which indicate useful information about the source, human pathological studies and delineation of atmospheric chemical transformations and interactions. Tracer aerosols of indium and lithium released into the updrafts of convective storms are removed with variable efficiency by precipitation scavenging. The temporal and spatial distributions of the deposited tracer indicates cell to cell transport aloft. Similar scavenging efficiencies and deposition patterns were observed for trace metals of anthropogenic origin. From deposition measurement source strength estimates can be made. The effect of the urban area on the planetary boundary layer indicates that the city roughness results in a sizeable convergence and upward motion of the air near the top of the subcloud layer, which, coupled with thermodynamic effects, results in a deeper mixed layer over the city than in the country. (1) Final report of previous 5-year measurement program prepared for printing 31 March 1977. (2) Preparation for second phase field measurements 31 August 1977. (3) Initialization of second phase field measurements 1 September 1977.

SUPPORTED BY U.S. Dept. of Energy, Div. of Biomedical & Environmental Research

5.0023, INVENTORYING AND MONITORING OF EARTH RESOURCES BY REMOTE SENSING

M.F. BAUMGARDNER, Purdue University, Agric. Experiment Station, Agronomy, *Executive Bldg., Lafayette, Indiana* 47907 (0008923; IND050020)

OBJECTIVE: Study the relationships between the multispectral radiation characteristics of soils and the physical and chemical properties of soils. Study the relationships between the radiation characteristics of vegetation and the properties of the soils on which the vegetation is growing. Conduct research on the application of remote sensing for determining land use, soil delineations, and vegetation mapping.

APPROACH: Multispectral scanner data obtained from aircraft and spacecraft platforms, aerial multispectral photography, and ground observation data will be used in the preparation of earth resources inventories. Both supervised and non-supervised programs will be used in the computer-implemented analysis of multispectral data. Ground observation data will be used as training sets for computer-implemented analysis and for testing analysis results. These techniques will be used in the preparation of land use inventories, soil surveys, and vegetation maps. Sequential data (multispectral scanner passes over the same site on different dates) will be used to detect and monitor changes.

PROGRESS: Significant progress was achieved in 1975 in defining the relationships between the chemical/physical properties of soils and the multispectral reflectance (0.5-2.37 microns) from surface soils and determining the utility of LANDSAT (satellite) multispectral data for identifying and delineating meaningful soils boundaries. The soil properties having the highest correlation with spectral reflectance are cation exchange capacity and the contents of silty, clay, organic matter and iron oxides, and correlations were higher with infrared reflectance than with visible reflectance. Results from soil survey research demonstrated that digital analysis of Landsat data can be used successfully for quality control of soil survey programs; to express quantitatively the mapping unit homogeneity by identifying, separating, and measuring inclusions occurring within mapping units; to identify and delineate by remote sensing soils differences which may not be discernible by visual observation, differences which may be related to internal drainage and/or other subsoil differences; to produce quickly and accurately general soils maps for counties by visual interpretation of observed false color images.

SUPPORTED BY U.S. Dept. of Agriculture, Cooperative State Research Service, Indiana

5.0024, LITHOSPHERIC MODELS OF NORTH AMERICA CONTINENT UTILIZING SURFACE AND SATELLITE GEOPHYSICAL DATA

W. HINZE, Purdue University, School of Science, Geosciences, *Executive Bldg., Lafayette, Indiana* 47907 (NAS 5-25030)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0025, MICROWAVE SATELLITE SENSOR TRADE-OFF ANALYSIS

J.C. HOLTZMAN, Univ. of Kansas, School of Engineering, Electrical Engin, *Learned Hall, Lawrence, Kansas* 66044 (NAS 9-15602)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0026, ESTIMATED WINTER WHEAT YIELD FROM CROP GROWTH PREDICTED BY LANDSAT

E.T. KANEMASU, Kansas State University, Agric. Experiment Station, Agronomy, *Anderson Hall, Manhattan, Kansas* 66502 (0070390; KAN-05-483)

OBJECTIVE: Evaluate an evapotranspiration model and growth equations for winter wheat in Kansas.

APPROACH: Leaf area index will be predicted from LANDSAT data. The evapotranspiration model will use LAI, solar radiation and temperature. Winter wheat growth will be estimated from growth equations derived from photosynthetic chamber data.

PROGRESS: An evapotranspiration model was developed for winter wheat. The daily meteorological inputs are solar radiation, maximum temperature, minimum temperature, and precipitation. Leaf area index is another input and allows the separation of evaporation and transpiration. The model compared favorably with lysimetric observations. Landsat imagery was used to estimate leaf area index (LAI) on a number of wheat fields throughout the growing season. The evapotranspiration model was then run using the Landsat-predicted LAI, therefore Landsat permitted the estimate of evapotranspiration from large commercial fields.

SUPPORTED BY Kansas State Government

5.0027, THICKNESS OF MARE BASALTS - WESTERN MARE BASIN

R.A. DEHON, Northeast La. University, Graduate School, *700 University Ave., Monroe, Louisiana* 71201 (NSG 7420)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0028, EXTENSION OF WATER VAPOR LIDAR TESTS

T.D. WILKERSON, Univ. of Maryland, Inst. for Fluid Dyn. & Math., *College Park, Maryland* 20742 (NAS 1-15378)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0029, SATELLITE ALTIMETRY

B. CHOVITZ, U.S. Dept. of Commerce, Geodetic Res. & Dev. Lab., *6001 Executive Blvd., Rockville, Maryland* 20852 (836910A3)

Measurements of altitude to the ocean surface from a satellite will provide, in the first approximation, information on the shape of the geoid assuming that sea level corresponds to the geoid, and in the second approximation information on tides, currents, salinity, and sea state which are deviations of sea level from an equipotential surface. The first use of satellite altimetry will therefore be geodetic and serve as a basis for the later oceanographic applications. The altimetry will provide direct dense measurements of geoidal heights on a global scale not possible by any

other means. It will also aid in improving the figure of the Earth as a whole in combination with other data.

Technical objective is to carry out analyses and provide computer programs in anticipation of data to be received from satellite altimetry. These programs not only handle altimetry, but provide a precise ephemeris of the satellite, which is required to exploit the precision of the altimetry.

Task is of ongoing nature. It is anticipated that a continuously improving flow of data from successive NASA satellites will be forthcoming through this decade. Technical reports of progress will be issued when significant results have been achieved.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Ocean Survey

5.0030, SYSTEMS DEVELOPMENT AND EXPERIMENTATION - AFOSIZING THE REST OF THE NWS

R.C. LEE, U.S. Dept. of Commerce, Integrated Systems Laboratory, *Silver Spring, Maryland* 20910 (8C27036)

TECHNICAL OBJECTIVE: To provide improved forecast capabilities at NWS offices without AFOS equipment, and to allow for enhanced communications with parent WSFO.

APPROACH: Analyze forecasters' responsibilities at non-AFOS WSO's and WSMO's and design a suite of intelligent terminals (both alphanumeric and graphic) to communicate with the parent WSFO and to satisfy the needs of the forecaster.

PROGRESS: An analysis of the 1981 design requirements for the 150 NWS offices (96 WSO's and 54 WSMO's) not receiving an AFOS minicomputer system has been completed. A phased implementation plan has been recommended. These offices will receive equipment by forecast area. They will first be equipped with an AFOS compatible alphanumeric display and keyboard, and a printer.

Drops on the Radar Reports and Warning Coordination System (RAWARC) teletype circuit and all other teletype lines (Services A, C and O) will be eliminated. Facsimile will be retained.

Later, enhancements will be added to bring AFOS graphics where required.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Weather Service

5.0031, TERMINAL WEATHER PREDICTION - MEDIUM-RANGE AVIATION FORECASTING

R.G. MILLER, U.S. Dept. of Commerce, Techniques Development Lab., *Silver Spring, Maryland* 20910 (8D5905)

TECHNICAL OBJECTIVE: To develop and implement new and improved automated techniques for the prediction of aviation weather elements at terminals.

APPROACH: The basic method used is the application of Model Output Statistics (MOS). Generalized operator prediction equations for regional areas or, when possible, single-station prediction equations are developed from a record of numerical model output. These statistical prediction equations are then used with operational numerical model predictions to produce automated forecasts.

PROGRESS: An improved medium-range forecast system, with several innovative features, became operational in FY 1977. Automated probability forecasts for six categories each of ceiling and visibility are routinely available for 233 U.S. terminals four times each day on request/reply teletypewriter circuits. We now provide an early aviation guidance package to field forecasters approximately 2 hr sooner than the previous system allowed.

The new features of our improved system are: (1) Monthly climatological variables, interpolated to daily values, are used as predictors. (b) Prediction equations for ceiling were developed simultaneously with those for cloud amount to improve the consistency between forecasts of these two elements. (c) Three-category combined ceiling/visibility forecasts, used at NMC as guidance for their products, are extracted from the six-category forecasts. This procedure makes the two types of terminal forecasts consistent with each other. (d) Threshold probabilities are used to transform the probability forecasts into a 'best' category type. This feature improves the bias characteristics of the lower category forecasts which were seriously underestimated in the previous system.

Work began on testing two new statistical techniques for producing terminal weather forecasts based on numerical model output. The first, Transnormalized Regression Probability (TRP) is a version of linear regression. The second new technique is a modification of the Regression Estimate of Event Probability (REEP) procedure. It is a nonlinear multivariate method known as Discrete Likelihood Functions (DLF).

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Weather Service

5.0032, ASH CAN SAMPLER EQUIPMENT - ASH CAN GONDOLA TASK

W.M. RICHARSON, U.S. Dept. of Commerce, Equipment Development Lab., Laboratory Support Branch, *Silver Spring, Maryland* 20910 (RFK206)

TECHNICAL OBJECTIVE: To provide Instrument Shop support (since 1970) of engineering requirements for ARL's Ash Can Sampler Equipment project.

APPROACH: To fabricate gondolas with trapdoor assemblies and related equipment for ARL's upper air sampling program.

PROGRESS: 1. Twenty large tenney releases were completed and packaged for shipment to Holloman AFB, New Mexico. 2. Work continued on the fabrication of 24 EV-13 valve protectors and door systems. 3. Eighteen Direct Flow Samplers (DFS) are being fabricated. Twelve are ready for testing.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Labs.

5.0033, REMOTE-SENSING TWENTY YEARS OF CHANGE IN THE HUMAN ENVIRONMENT IN MASSACHUSETTS, 1951-1971

W.P. MACCONNELL, Univ. of Massachusetts, Agric. Experiment Station, Mcintire Stennis Program, *Amherst, Massachusetts* 01002 (0059477; MAS00013)

OBJECTIVE: Use remote-sensing techniques to monitor forest and other environmental changes in Massachusetts from 1951-1971. The maps prepared from 1971 aerial photography will provide ground truth for training in interpretation of Earth Resources Technology Satellite (ERTS) imagery.

APPROACH: Develop and test the use of aerial photogrammetric techniques as a tool for identifying and classifying agricultural, forest and wet lands; mining and waste disposal areas, as well as urban land and outdoor recreation sites. Determine changes in vegetation and land use which have taken place since the state was photographed and mapped in 1951 and 1952 by a similar system. Establish predictions of future rates and patterns of change for major land-use types based on changes over the past 20 years. Population growth and construction of transportation facilities will be used to help predict future change. Provide vegetative cover and land-use maps of the entire state for watershed managers, foresters, wildlife biologists, resource planners and others interested in the environment. Study urban growth and decay, especially the situation in the urban-agriculture or urban-forest interface in Massachusetts.

SUPPORTED BY U.S. Dept. of Agriculture, Cooperative State Research Service, Massachusetts

5.0034, STRATOSPHERE-MESOSPHERE TIME-SPACE RELATIONSHIPS

A.E. COLE, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF581530)

AF function - design and operation of aerospace vehicles. Deficiency - distribution as well as time and space variations of wind and the thermodynamic properties of the atmosphere for levels up to 100 km must be known in order to establish design criteria and operational procedures for various types of reentry

vehicles. Objective - to develop mathematical models of the atmosphere which portray the time and space variations of temperature, density and wind at altitudes up to 60 km and complete a set of mean monthly atmospheres to 90 km for 15-degree intervals of latitude. How development contributes - a more detailed knowledge of atmospheric structure below 100 km will be important in targeting and in the design of systems for intercepting ballistic missiles.

Mathematical models of the atmosphere will be developed using all available rocket observations of temperature and density at heights between 30 and 100 km and appropriate radiosonde data for levels below 30 km. Statistical techniques will be used to develop models of the time and space variations of temperature, density and wind for levels up to 60 km. Statistical arrays that describe the decay in the coefficients of interlevel correlations with increasing altitude separation will be derived from analyses of radiosonde and rocketsonde data. The decay of the coefficient of correlation of temperatures and densities between two points with increased horizontal separation will be developed from nearly simultaneous observations for various locations and from data taken from published 10, 5, 2 and 0.4 mb maps, prepared on a weekly basis by NOAA. The decay in the correlation coefficients with time (1-24 hours) will be developed from published observations. Part of the work under this work unit was formerly carried out under work unit 86240106.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0035, THE OZONE ABSORPTION SPECTRUM IN THE UV REGION

D.H. DATAYAMA, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF581170)

AF function - environmental impact of high-altitude vehicles. Deficiency - effect of aircraft effluents on solar UV absorption and on ozone. Objective - measure and analyze the absorption spectrum of ozone. How research contributes - the ozone absorption spectrum will be analyzed to improve ozone concentration computations used for determination of the environmental impact of Air Force vehicles.

The absorption spectrum of ozone in the UV region will be analyzed by studying its isotope shifts. An ozonizer with its associated vacuum system and various absorption cells will be used with a 3 m spectrograph. The zone absorption data will be recorded in the UV region at various pressures, temperatures, and cell lengths.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0036, TEC MEASUREMENT TECHNIQUES

J.A. KLOBUCHAR, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF580900)

AF function - radio frequency ranging systems for satellite detection, navigation and tracking. Deficiency - the Air Weather Service has a real-time monitoring network for making measurements of the TEC of the ionosphere, the parameter directly responsible for errors in satellite ranging systems. This monitoring network is severely limited in geographic coverage because the present standard technique of measuring TEC requires the ground measurement of VHF signals transmitted from geostationary satellites of opportunity, with consequent unreliable signal availability. Objective - new schemes for making real-time TEC measurement, improving data reliability and coverage area, yet maintaining data quality, timeliness and program cost-effectiveness will be investigated for AWS use. How research contributes - the AWS real-time TEC measurement program supports a priority 1-1 special access strategic system. The results of this study will contribute to greatly improved TEC predicting and measuring capability on a real-time basis.

A survey of possible techniques of measuring TEC and related parameters, and of likely methods of implementing these measurement techniques, will be made. This includes new sources of opportunity, such as the dual frequency NAVSTAR/GPS signals, as well as signals tailored to this specific task. Trade-offs will be made in technical feasibility of various options versus measurement accuracy and relative cost-benefit ratio of these options.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0037, BALLOON BORNE TACTICAL LORAN ANTENNA

A.O. KORN, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF580630)

AF function - improve reliability of LORAN aircraft navigation systems. Deficiency or opportunity - present 400 ft.-high LORAN antenna towers may become inoperative due to hostile action or severe weather. A balloon-borne antenna system would be used until a new tower is erected. Objective - to design and test a simplified balloon-borne antenna system that can be erected by trained but inexperienced personnel. How research contributes - research will lead to simplified rigging and instrumentation.

A prototype 45,000-ft. BJ balloon has been built and tested with a prototype antenna. In the worldwide operational mode, the balloon system will have to be erected rapidly by Air Force communications service personnel having limited experience in the use of the system. The system must therefore be kept as simple as possible. The 45,000 cubic ft. tethered balloon will be redesigned with an aim towards operation simplification. Balloon inflation systems, confluence point hardware, and balloon instrumentation will likewise be re-engineered so that they can be successfully handled by personnel with limited training. After the balloon antenna system has been redesigned and tested, air-transportable operational units are to be procured by the SPO. In order to do this, a complete drawing and specification package will be required so that operational systems can be procured on a fixed price contract.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0038, ATMOSPHERIC OPTICAL MODELING

E.P. SHETTLE, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF581020)

AF function - reconnaissance, communications, surveillance, guidance, target acquisition and tracking. Deficiency - the performance of any optical system looking through the atmosphere is significantly degraded by atmospheric light scattering and absorption and it, therefore, depends in a complex way on the variability of the state of the atmosphere in the theater of operation. Objective - develop single and multiple scattering codes applicable to previously developed haze models as well as to new fog models and to evaluate, based on contractor study and own in-house atmospheric optical models the feasibility of satellite-based seeability measurements. How research contributes -achieving the objective of the work unit will lead to an improved capability to predict the effects of the atmosphere on EO systems, which range from estimating the probability of detecting laser systems from off-axis scattering of the beam, to calculating the contribution of scattered sunlight to the background radiance of the earth's limb.

Develop computer codes for calculating the propagation of singly scattered light through the atmosphere, using the scattering properties of the aerosol models previously developed under this task, and the appropriate portions of the LOWTRAN or HITRAN codes for the point-to-point transmission calculation. Study the dependence of the optical properties of different types of fogs on the meteorological conditions. Investigate the feasibility of satellite-based measurements of atmospheric seeability in the tactical environment.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0039, ATMOSPHERIC COMPOSITION BY UV AND ELECTRON SPECTROSCOPY

R.A. VANTASSEL, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF581290)

AF function - vehicle tracking during flight and reentry, trajectory prediction, communication systems. Deficiency - present atmospheric models predict only slight variability of the density of the upper atmosphere below 200 km; however, empirical data show this conclusion to be incorrect and observations indicate density changes as great as 50 percent in both space and time at altitudes between 120 and 200 km. This altitude region, important for Air Force operations, will be studied on a worldwide basis by density experiments aboard the DMSP satellites. The present work will support these experiments. Objective -in situ measurements with rockets of atmospheric parameters to provide correlative data for comparison with photometric data from DMSP satellites. How research contributes - provides direct, low-altitude measurements of pertinent atmospheric properties as an aid in understanding the remote optical measurements made from DMSP satellites.

The goal of this effort is to measure at sounding rocket altitudes, various atmospheric parameters which may be used to verify the model development required for the interpretation of optical data acquired by sensors aboard DMSP satellites specifically for the purpose of remote density determination. Rocket measurements will be made of the photoelectron flux and differential energy distributions for energies between 0 and 100 electron volts, of the radiance of nitrogen airglow at 3,371 angstroms, and of the density and composition of the upper atmosphere as established by solar ultraviolet photon absorption rates. All measurements will be made from a single rocket payload in the altitude range between 120 and 200 km.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0040, LARGE-SCALE OSCILLATORY AND CONVECTIVE MOTIONS ON THE SUN

S.P. WORDEN, U.S. Air Force, Geophysics Laboratory, *L.G. Hanscom A.F.B., L.G. Hanscom A.F.B., Bedford, Massachusetts* 01730 (DF580780)

AF function - communications, surveillance, detection, tracking. Deficiency - inadequate knowledge of solar environment, disturbances, and physics limits ability to predict events which disrupt and degrade AF systems. Objective - to measure large-scale oscillatory (global pulsations) and convective (giant cells) motions on the solar surface and to develop theoretical models to explain these phenomena, which, if they exist, would provide information about the structure and behavior of the solar interior, and its influence on surface phenomena. How research contributes - several observations have suggested the existence of large-scale motions which have their origin deep within the sun. It is necessary to verify and provide more details of these motions and the resultant transfer of energy and magnetic fields from the interior to the surface, since theoreticians believe that these motions determine the nature of the solar activity cycle. Statistical fluctuations in this 22-year cycle probably determine the strength, lifetime, and frequency of hydromagnetic storms in individual active centers, which in turn cause the well-known solar induced environmental disturbances.

Observations made with the Sacramento Peak tower telescope diode array, echelle spectrograph, and universal birefringent filter, will be analyzed and compared with theoretical models developed under contract, to determine the nature of energy transport through the solar atmosphere, and the interaction between magnetic fields and material motions, both in active sunspot centers and in quiet regions on the sun.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0041, THE CHEMISTRY AND CHEMICAL EVOLUTION OF PLANETARY ATMOSPHERES

R.G. PRINN, Mass. Inst. of Technology, School of Science, Meteorology, 77 *Massachusetts Ave., Cambridge, Massachusetts* 02139 (ATM77-01252)

This grant funds a theoretical and modeling study of the chemistry and chemical evolution of planetary atmospheres. Particular areas to be emphasized include photochemical models of the atmospheres of Venus, Mars, Jupiter, and Uranus, and the development of a unified theory of the origin and evolution of planetary atmospheres. This work is a follow-up to earlier work supported under NSF grant ATM-7414116.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0042, CLOUD SPECIFICATION BY AUTOMATIC MULTISPECTRAL IMAGERY ANALYSIS

R.K. MEHRA, Scientific Systems Inc., *1640 Massachusetts Ave., Cambridge, Massachusetts* 02138 (DF248620; F19628-77-C-0208)

AF function - all-weather operation of tactical and strategic forces. Deficiency - limited ability to specify and forecast cloud conditions globally in real time. Development - develop numerical techniques to specify cloud conditions automatically using multispectral imagery data from existing and potential sensors on meteorological satellites. How development contributes - improve ability to specify cloud altitude, to determine whether cloud is ice or water, and to detect areas of precipitation.

Combine imagery information from visible, near IR, IR, and microwave frequencies. Utilize available satellite imagery and model imagery for frequencies not yet available.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0043, TV DENSITOMETER MODIFICATION AND OPERATION ENV

C.A. TROWBRIDGE, Photometrics Incorporated, *Lexington, Massachusetts* 02173 (DF580410; F19628-77-C-0154)

AF function - environmental impact statements of high-altitude Air Force operations. Deficiency - current or anticipated AF operations in the stratosphere may deposit pollutants and it is important to assess their dispersion and residence time. Objective - to measure parameters that characterize stratospheric dynamics, to incorporate into models that will accurately predict the dispersal rate and residence time of materials injected into the stratosphere. How research contributes - the instrument being modified will provide the raw data for in-situ measurements of parameters of the wind field over altitudes ranging from about 15 to 50 km.

A computer controlled stage will be incorporated into an existing digital densitometric system to allow very accurate measurements of position of smoke trail images. The measurements are used to compute winds, and windshears, which are analyzed to define turbulent diffusion coefficients leading to estimates of the dispersal rate and residence time of pollutants.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0044, NAVY ENVIRONMENT - IMAGE EVALUATION COASTAL REMOTE SENSING

F.J. THOMSON, Environmental Res. Inst. Mich., *P.O. Box 618, Ann Arbor, Michigan* 48107 (DN475424; N00014-74-C-0273)

The composition of material of beaches and river banks above and under water will be investigated, using remote sensing techniques and, in particular, new methods of data handling and information extraction. This research is expected to provide information on beach and shore characteristics and on natural parameters influencing the transformation of energy from water onto the shore. An immediate application of this information is in the improvement of scanning multispectral bathymetry for remote measurement of water depth. This information is essential for all amphibious and inshore warfare activities.

Contractor will refine two models for reconnaissance of beach environment developed by him under the previous contract, and extend the investigation of other methods to remotely detect beach characteristics in the 0.4 to 2.5 and 8 to 14 micrometer ranges of the electromagnetic spectrum. To improve the ability to distinguish between various optical properties affecting the ability to exactly determine water depth from multispectral scanners, a combination of logarithmic and linear treatment of data will be applied to separate various bottom types. Addition of a supporting active system will be discussed. The provision of a full set of optical water properties is a future goal, the parameters of which are to be discussed.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0045, DEVELOP, FABRICATE, TEST, AND SUPPORT HARDWARE FOR THE SAN MARCO/WIND AND TEMPERATURE EXPERIMENT
G.R. CARIGNAN, Univ. of Michigan, School of Engineering, Electrical & Computer Engin, *Ann Arbor, Michigan* 48106 (NAS 5-25031)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0046, LAND-USE MAPPING IN DIGITAL FORMAT FROM AIR PHOTOS
C.E. OLSON, Univ. of Michigan, School of Natural Resources, *Ann Arbor, Michigan* 48104 (0067794; MICY00040-F)

OBJECTIVE: Develop an interactive, digital, storage and retrieval system for land-cover data extracted from air photos. Complete land-cover mapping of Washtenaw Co., Mich., in this digital format.

APPROACH: A one hectare grid based on the UTM coordinate system is used as the matrix for land-cover data. Also included is a four-level expansion of the classification system in USGS Circular 671, and demographic, transportation, and soil permeability data. The classification scheme includes 150 forest classes. All data inputs are based on human interpretation of existing air photos.

PROGRESS: Testing of the interactive retrieval software revealed the need for substantial modifications to the CLOVER program developed for Project SNAFOR to accommodate the flexibility required. Adaptation of the LIGMALS software developed for processing LANDSAT data appears more promising than revising CLOVER.

SUPPORTED BY Michigan State Government

5.0047, DEVELOPMENT OF STRATOSPHERIC SPECIES MEASUREMENT AND TECHNIQUES
UNKNOWN, Univ. of Michigan, Graduate School, *Rackham Bldg., Ann Arbor, Michigan* 48104 (NASW 3137)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0048, PHYSIOGRAPHIC CLASSIFICATION OF SOUTHERN PINE FOREST LANDS
W.F. MILLER, Mississippi St. University, Agric. Experiment Station, *102 Experiment Station Bldg., Mississippi State, Mississippi* 39762 (0060698; MIS-0606)

OBJECTIVE: Organize physiographic land patterns into a system having significance and utility for resource managers. Develop a physiographic map of southern region using the new system.

APPROACH: Current information on physiography, soils, and surface geology related to forest vegetation will be analyzed and coordinated. Localized information will be reorganized to form a unified regional system. Map development will be on a state basis, utilizing local authorities, aerial photography, and space imagery when appropriate.

PROGRESS: Additional LANDSAT imagery was ordered and provided to the Project Leader (Dr. Earl Hodgkins); the entire file of negatives was also provided to Dr. Hodgkins. Considerable time was spent in answering inquiries and providing information concerning availability of LANDSAT imagery, and procedures for acquiring the imagery. A presentation was made at the meeting, 'Ecosystems of the Appalachian Region -Classification and Mapping', held at Eastern Kentucky University, in August, 1976. The presentation dealt with the evolution of the land capability classification system being utilized with the LANDSAT imagery. On the basis of this presentation, the group evolved the following mission and objectives: Mission: To develop a multilevel classification of the ecological systems of the Appalachian Region satisfying the assessment objectives of several agencies, and to apply this system to map the ecosystems of the Appalachian Region. Developmental Objectives: 1. To recognize and map physiographic provinces and habitat regions at the 1:1,000,000 scale in a format similar to Hodgkins, Cannon, and Miller's 1976 map of Mississippi and Alabama for the 13 southern states and to extend this system to other states of the Appalachian Region. 2. To name the system and develop a guidebook on its use. 3. To sponsor a communications meeting on Ecosystems of the Appalachian Region. 4. To develop a proposal for multi-agency funding for an ecosystem classification.

SUPPORTED BY U.S. Dept. of Agriculture, Cooperative State Research Service, Mississippi

5.0049, MONODISPERSE CLOUD EXPERIMENT
D.E. HAGEN, Univ. of Missouri, Graduate School, *103 Parker Hall, Rolla, Missouri* 65401 (NAS 8-32976)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0050, IDENTIFICATION OF ALTERNATIVES FOR LOCAL LAND USE DECISIONS
M.P. CARLSON, Univ. of Nebraska, School of Arts & Sciences, Geology, *Lincoln, Nebraska* 68508 (0066985; NEB-02-001)

OBJECTIVE: Develop remote sensing products to provide data for land use decisions. Establish criteria for defining critical environmental areas. Design procedures for delimiting specific use areas. Identify alternative definitions of land use categories. Assess impacts of these definitions.

APPROACH: Prepare and test land use maps based on ERTS imagery & RB-57 color infrared photography. Prepare, test and utilize definitions for critical environmental areas based on existing definitions & local needs. Identify present land use definitions & assess their impact on efficiacy of local land use planning & zoning.

PROGRESS: Research was continued in the area of land use planning. Manuscripts of research results are in process.

SUPPORTED BY U.S. Dept. of Agriculture, Cooperative State Research Service, Nebraska

5.0051, ATMOSPHERIC CLOUD PHYSICS LABORATORY ICE CRYSTAL GROWTH EXPERIMENT FOR MISSION I
J. HALLETT, Univ. of Nevada System, Desert Research Institute, *Reno, Nevada* 89507 (NAS 8-32977)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0052, NIGHTTIME AND DAYTIME ORBITAL SURVEY OF LIGHTNING AND CONVECTIVE PHENOMENA EXPERIMENT SUPPORT
B. VONNEGUT, State University of New York, School of Arts & Sciences, Atmospheric Science, *1400 Washington Ave., Albany, New York* 12222 (NAS 8-32893)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0053, WAVE PROPAGATION STUDY
S.H. GROSS, Polytechnic Inst. of New York, School of Science & Engin., Electrophysics, *333 Jay St., Brooklyn, New York* 11201 (NAS 5-25076)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0054, STUDIES OF THE EQUATORIAL IONOSPHERE
D.T. FARLEY, Cornell University, School of Engineering, Electrical Engin, *242 Carpenter Hall, Ithaca, New York* 14850 (ATM73-06598 A03)

This grant funds experimental and theoretical work on ionospheric irregularities and plasma instabilities. In particular, it funds: 1. a study of the neutral temperature and the east-west wind velocity in the electrojet region (i.e., around 100 km), using a recently installed multiple-beam antenna array and radar system at the Jicamarca, Peru, incoherent-scatter radar facility; 2. upgrading of the Jicamarca facility to allow more accurate measurements of the winds and temperatures; and 3. studies of equatorial spread F, and of the plasma instabilities responsible for the spread F. Completion of these studies will add significantly to our understanding of some of the processes at work in the atmosphere.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0055, SCATHA MODEL
J. ROCHE, U.S. Natl. Aero. & Space Adm., Lewis Research Center, *21000 Brookpark Rd., Cleveland, Ohio* 44135 (DF582010)

AF function - communications, surveillance and navigation. Deficiency - anomalous behavior of high-altitude satellites due to spacecraft charging. Objective - a 3-d SCATHA satellite computer model will be constructed. How research contributes - the SCATHA sheath model is required for the interpretation of data collected by SCATHA.

A finite-element computer model of the SCATHA satellite is set up. Potentials on the satellite surface and in the surrounding space are calculated. Photoemission, secondary emission and ambient plasma are accounted for. Particle trajectories from guns and shadowing are calculated.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0056, SOLAR TERRESTRIAL CLIMATIC RELATIONSHIP SYMPOSIUM
T.A. SELIGA, Ohio State University, School of Engineering, Electrical Engin, *190 N. Oval Dr., 102 Administration Bldg., Columbus, Ohio* 43212 (NASW 3149)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0057, FRONTOGENESIS STUDY
D.A. BARBER, Oregon State Higher Educ. Sys., School of Science, Atmospheric Science, *126 Agriculture Hall, Corvallis, Oregon* 97331 (NAS 8-32694)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0058, FIELD SEARCH FOR METEORITES, ANTARCTICA
W.A. CASSIDY, Univ. of Pittsburgh, School of Arts & Sciences, Earth & Planetary Sciences, *4200 5TH Ave., Pittsburgh, Pennsylvania* 15260 (DPP77-21742)

The University of Pittsburgh will continue, under grant DPP76-10800, to investigate areas of glacial ablation, moraines, and other areas of accumulation in Antarctica for meteorites. The Japanese Antarctic Expeditions have found very large numbers of meteorites in areas of glacial ablation near the Yamato Mountains of East Antarctica. Dr. William Cassidy of the University of Pittsburgh investigated similar areas of potential meteorite accumulation in the McMurdo area of Antarctica during the 1976/77 field season and found 11 meteorites. The goal of this project is to understand better the depletion areas of continental ice caps and to search for meteorites that may have fallen on the Antarctic Ice Cap in the past. These meteorites also have great significance to the study of past radiation flux in outer space.

Four University of Pittsburgh scientists will do field research in the McMurdo area, Antarctica, during the 1978/79 summer season.

SUPPORTED BY U.S. National Science Foundation, Div. of Polar Programs

5.0059, RESULTS OF THE CONSERVATION RESERVE PORTION OF THE SOIL BANK PROGRAM
A.P. MARSINKO, Clemson University, School of For. & Rec. Resour., Mcintire Stennis Program, *Long Hall, Clemson, South Carolina* 29631 (0071640; SC00039-FR)

OBJECTIVE: Evaluate the effect of the program on forestry in South Carolina. Analyze differences in effectiveness in the state. Obtain information about the landowners' attitudes toward the program. Determine the present status of the lands.

APPROACH: Information will be gathered concerning the owners, locations, and acreages of lands involved in the Conservation Reserve Program. From plats and aerial photos, or other records, the current owners of lands that participated in the Conservation Reserve will be determined, along with areas and significant geographic factors. Several participants will be visited. Questionnaires will be sent to a larger sample.

PROGRESS: This study seeks to analyze the effect of the Conservation Reserve Portion of the Soil Bank Program in South Carolina. Both the long-term effect as evidenced by present land use on areas involved in the program and the attitudes of some participants will be investigated. The literature review is partially complete.

SUPPORTED BY U.S. Dept. of Agriculture, Cooperative State Research Service, South Carolina

5.0060, GUST GRADIENT ANALYSIS
W.F. ROST, Univ. of Tennessee, Graduate School, *W. Cumberland Ave. S.W., Knoxville, Tennessee* 37916 (NAS 8-32692)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0061, ENERGY CONSERVATION TASK
W.T. SNYDER, Univ. of Tennessee, School of Engineering, Engineering Sc & Mech, *W. Cumberland Ave. S.W., Knoxville, Tennessee* 37916 (NAS 5-25101)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0062, RESEARCH IN IDENTIFYING DOMINANT ERROR SOURCES INHERENT IN THE ESTIMATION PROCESS BY SOLVING FOR POINTS ON THE EARTH'S SURFACE
B.D. TAPLEY, Univ. of Texas, School of Engineering, Aerospace Engin & Engin Mech, *200 W. 21st, Austin, Texas* 78712 (NAS 5-25018)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0063, TECHNOLOGY DEMONSTRATION MEASUREMENT FOR THE MOLECULAR WAKE SHIELD
J.H. HOFFMAN, Univ. of Texas, Graduate School, *Dallas, Texas* 75230 (NAS 8-32689)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0064, DATA ANALYSIS SUPPORT FOR LOW ENERGY GAMMA-RAY SPECTROMETER (LEGS) BALLOON PROGRAM
R.C. HAYMES, Rice University, Graduate School, Space Science, *6100 Main St., Houston, Texas* 77001 (NAS 5-25032)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0065, PLANNING, IMPLEMENTATION, EVALUATION OF REMOTE SENSING (PIERS)
D.E. LICHY, U.S. Army, Coastal Engin. Res. Center, *Kingman Bldg., Fort Belvoir, Virginia* 22060 (31581)

OBJECTIVE: To plan, implement and evaluate the state of art of remote sensing technology related to coastal engineering.

APPROACH: Review research related to coastal engineering and implement where applicable remote sensing techniques. Evaluate the cost-effectiveness and relate to operation Corps needs. Develop algorithms for the use of remote sensing in coastal engineering. This will involve multi-sensors evaluation such as LANDSAT, SEASAT, multi-spectral, laser and conventional aerial photography.

SUMMARY: This work unit will enable a more efficient use of remote sensing techniques in Corps projects in the coastal area. Development of methodologies and a reference manual of remote sensing techniques will be provided for use in coastal engineering projects and studies.

SUPPORTED BY U.S. Dept. of Defense, Office Chief of Engineers, Corps of Engineers

5.0066, GEOLOGICAL THERMOMETRY - NASA
J.S. HUEBNER, U.S. Dept. of The Interior, Geological Survey, Geologic Division, *12201 Sunrise Valley Dr., Herndon, Virginia* 22092 (9710-01155)

Determine the physical properties and phase relations of pyroxenes, using a combination of optical and electron microprobe analyses, X-ray and electron diffraction, and experimental petrology. Apply the results to problems in lunar petrogenesis such as basaltic magma genesis; extent and conditions of metamorphic equilibration; and the dating of events which caused mineral transformations. The major topics of investigation will be: 1) Interpret the thermal and structural histories of pyroxenes, estimating the lengths of time that each structural state was annealed at temperatures that we will determine from our data on pyroxene phase relations. We are interested in all processes from the nucleation of pyroxene in basalts at high temperature to the low-temperature annealing that imposes the texturally mature fabric, the extensive chemical reequilibration, and the high degree of cation order in 'Apollonian' metamorphic rocks. 2) Determine, experimentally and from analysis of lunar samples, the volume diffusion rates of calcium, magnesium and iron in pyroxenes in order to calculate the lengths of time necessary to grow pyroxene lamellae during lunar annealing processes. 3) Complete an experimental investigation of the partial melting of pyroxenes (orthopyroxene, pigeonite, augite) and model lunar mantle peridotite and pyroxenite. Continue to refine our models for the derivation of lunar basaltic magmas, and characterize the solid residues of such processes. 4) Complete a study of the occurrence, crystal chemistry, and significance of protoenstatite. 5) By providing samples and mineralogical expertise, participate in cooperative investigations of the calorimetric properties, electrical conductivity, and radiative heat transfer of pyroxenes.

SUPPORTED BY U.S. Dept. of the Interior, Geological Survey, Geologic Div

5.0067, COASTAL PLAINS GEOPHYSICAL COOPERATIVE
I. ZIETZ, U.S. Dept. of The Interior, Geological Survey, Geologic Division, *12201 Sunrise Valley Dr., Herndon, Virginia* 22092 (9730-01361)

STATES TO WHICH PROJECT PERTAINS: North Carolina, South Carolina, Georgia.

The project is to be expanded to cover additional areas in North Carolina, South Carolina, and Georgia, as well as areas in Virginia and Florida. We will use aeromagnetic and gravity maps, as well as drill hole information to derive geologic map of basement.

SUPPORTED BY U.S. Dept. of the Interior, Geological Survey, Geologic Div.

5.0068, REGIONAL PLANNING & RESOURCE MANAGEMENT - APPLICATIONS OF MONITORING AGRICULTURAL LAND USE UTILIZING REMOTE SENSING PHOTOGRAPHY
B.J. NIEMANN, Univ. of Wisconsin, Agric. Experiment Station, Landscape Architecture, *116 Agriculture Hall, Madison, Wisconsin* 53706 (0062731; WIS01906)

OBJECTIVE: Evaluate the use of remote sensing (near infrared photography .7 to .9 microns), thermal 8. to .2 microns and sensing platforms including conventional, high-altitude and satellite systems as a data source for agriculture and rural land use planning. Emphasis will be placed on the detection of resources for inclusion in the projected state-wide spatial resource data bank.

APPROACH: With the assistance of a remote sensing technical/liason committee, data needs potentially applicable for detection by remote sensing will be identified. Interpreted data will be compared with ground truth supplied by the technical/liason committee or by comparing with either of three existing spatial computer data banks.

PROGRESS: For rural regional resource planning and management the research results indicated that (1) a comprehensive understanding of large and complex landscapes is obtainable with high-altitude infrared photography and LANDSAT imagery; (2) the transfer and use of assessment variables from other resource regions for assessing landscape variation is inappropriate; (3) data analysis techniques such as cluster analysis (i.e., agglomerative and polythetic) are quite useful in gaining a new and more complete understanding of a large and complex landscape region especially when discriminating variables are unknown; (4)tandem stratified geographic sampling is an efficient and discriptive procedure by which to manage and utilize large volumes of data; (5) high-altitude color infrared photography (1:120,000) taken in the fall in conjunction with the application of sampling and cluster analysis techniques provides a useful data base for assessing rural landscape quality; (6) LANDSAT imagery paper products (1:250,000 and 1:500,000) is more efficient but not as descriptive in assessing regional landscape variance; and LANDSAT imagery proved to be especially useful in assessing landscape change if procedures are available for between date comparisons.

SUPPORTED BY U.S. Dept. of Agriculture, Cooperative State Research Service, Wisconsin

5.0069, BALLOON-BORNE AEROSOL MEASUREMENTS - GROUND TRUTH FOR SAM II
D.J. HOFMANN, Univ. of Wyoming, School of Arts & Sciences, Physics, *P.O. Box 3435, University Station, Laramie, Wyoming* 82071 (NAS 1-15377)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

5.0070, LOCATING AREAS OF HIGH WIND ENERGY POTENTIAL BY REMOTE OBSERVATIONS OF AEOLIAN GEOMORPHOLOGY AND TOPOGRAPHIC FEATURES
R.W. MARRS, Univ. of Wyoming, School of Arts & Sciences, Geology, *P.O. Box 3435, University Station, Laramie, Wyoming* 82071 (EY-76-S-06-2343)

This follow-on effort will assess the regional applicability of the LANDSAT satellite's imagery as a tool for locating areas of high wind energy potential. The current study of observed parameters will continue, to allow quantitative estimation of wind characteristics. Data will be gathered on the use of stabilized dunes as indicators of present-day wind characteristics. (ERDA-77-32)

SUPPORTED BY U.S. Dept. of Energy, Div. of Solar Technology

5.0071, INVESTIGATION OF NEAR SURFACE AEROSOL PROPERTIES IN ARID REGIONS 15119-GS
J.M. ROSEN, Univ. of Wyoming, School of Arts & Sciences, Physics & Astronomy, *P.O. Box 3435, University Station, Laramie, Wyoming* 82071 (DA0F9150; DAAG29-78-G-0048)

To develop a desert aerosol model capable of predicting vertical aerosol distribution from surface measurement of appropriate parameters. Relevance - this research is critical to the Army Atmospheric Sciences Laboratory support of the tri-service high-energy laser program. The field measurements of aerosol will be taken near a high-energy laser test facility at White Sands Missile Range. There also is general relevance to any signal transfer in a slant-range mode.

Fine-scale vertical distribution of aerosol concentration in several size ranges will be obtained from a tethered balloon operating with a 10 kg payload to altitudes of 1,700 feet. Concurrent vertical profiles of wind, temperature and humidity will be measured. This data will be used to develop the models outlined in the objective.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, MATERIALS PROCESSING IN SPACE EXPERIMENT - WHOLE-CELL ELECTROPHORESIS ABOARD SPACELAB
R. CHIOVETTI, Univ. of Alabama, Graduate School, *720 S. 20th, Birmingham, Alabama* 35233 (NAS 8-33014)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0002, CONDUCTING EXPERIMENTS TO DETERMINE THE OPERATING LIMITATIONS OF THE HANNIG CONTINUOUS FLOW ELECTROPHORETIC SEPARATOR
G. SACHS, Univ. of Alabama, School of Medicine, Medicine, *1919 7TH Ave. S., Birmingham, Alabama* 35233 (NAS 8-32923)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0003, ADVANCED DEVELOPMENT OF INSTRUCTOR/OPERATOR DISPLAYS FOR AIR-TO-GROUND WEAPONS DELIVERIES
K.I. MEHRER, U.S. Air Force, Human Resources Laboratory, *Williams A.F.B., Chandler, Arizona* 85224 (DF223790)

To further develop new graphic displays for scoring air-to-ground weapon deliveries, including bomb, strafe, and rocket systems.

At present, the AFHRL/FT Advanced Simulator for Pilot Training (ASPT) has alphanumeric and graphic CRT displays for strafe and bomb deliveries on a conventional range along with bomb deliveries on tactical targets. There exists a need for further development of the displays for more information along with new scoring systems for strafe and rocket deliveries. The development will include new scoring programs and new and expanded displays developed from present ASPT systems.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0004, COMPARISON OF STRENGTH BUILDING AND AEROBIC TRAINING
H. OLREE, Harding College, School of Education, Physical Educ Hlth & Recr, *Searcy, Arkansas* 72143 (NAS 9-15596)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0005, PREDICTIONS OF MOTION SICKNESS SUSCEPTIBILITY BASED ON HUMAN AUTONOMIC RESPONSE PATTERN DATA - A MATHEMATICAL MODEL
R.C. STROHMAN, Univ. of California, School of Letters & Science, Zoology, *Berkeley, California* 94720 (NCA 2-50803)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0006, SIMULATOR TRAINING REQUIREMENTS AND EFFECTIVENESS STUDY - PHASE TWO - DATA COLLECTION, ANALYSIS, AND FINDINGS
D. NICKLAS, Canyon Research Group Inc., *32107 Lindero Canyon Rd., Suite 123, Thousands Oaks, California* 91361 (DF228410; F33615-77-C-0067)

To collect and analyze information bearing upon the cost and effectiveness of important characteristics of flight simulators. Such information shall be used to assist in determining the simulation required to meet each specific behavioral requirement for training, indicating the most effective techniques for using aircrew training devices, and specifying maximally effective instructional features of such devices. This is the second of five related work units for the Simulator Training Requirements and Effectiveness Study (STRES). This work unit will produce systematic information which will be further reviewed and consolidated in the final (fifth) work unit. It also will indicate critically needed studies which will be conducted under a fourth work unit to be documented under project 1123. The third work unit also will be documented under project 1123. It will assure coordination with related programs of the Flying Training Division (AFHRL/FT).

This work unit involves 5 sequential, but interrelated, steps: (1) analyze all available relevant reports and systematize the resultant information pertinent to the cost and effectiveness of important characteristics of flight simulators, (2) prepare plans for step 3, (3) collect, analyze, and systematize relevant information obtained from on-site surveys and interviews, (4) prepare special summary reports of the information obtained, and (5) plan critically needed experimental studies. The tri-service management team will maintain surveillance over these steps. Milestones for steps are: (1) July-August 77, (2) August - November 77, (3) October 77-January 78, (4) March 78-September 79, (5) March 78-April 19.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0007, SCIENTIFIC COMMUNICATION IN PLANETARY BIOLOGY AND BIOSCIENCE
E. WATERS, George Washington Univ., Graduate School, *901 23rd St. N.W., Washington, District of Columbia* 20006 (NASW 3165)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0008, INCIDENCE AND COSTS OF AIRSICKNESS IN NAVAL AVIATION
F.E. GUEDRY, U.S. Navy, Perceptual & Behav. Sci. Div., *Pensacola, Florida* 32508 (DN777278)

The immediate aim of this project is to document the incidence and cost of the airsickness problem in naval aviation. A recent pilot study of NFO trainees suggests that airsickness accounts for a larger proportion of student attritions than has been suspected heretofore. Related evidence indicates significant additional costs from repeated hops, extensive medical and psychological evaluation, treatment programs, etc., all resulting in increased time to train. It is expected that availability of incidence and cost data will permit the judicious selection of remedial options appropriate to the achieved level of training.

Initial priority will be placed on conducting a longitudinal study of airsickness in NFO trainees as they pass from VT-10 basic training through VT-86 advanced training to selected assignments in replacement air groups. Airsickness incidence and severity data along with performance degradation measures will

be obtained from each student and each instructor for each training hop over the entire training period. To establish a firm statistical background, it is planned to follow 10-12 consecutive NFO classes so as to achieve a minimum n of 200 students and 8,000 hops. Airsickness incidence will be related to particular hops, individual order of hops received, delays in training, seasonal variations in turbulence, and over-all student performance. Other data to be collected include case-by-case reasons for attrition, costs of attrition, costs for repeated hops, adaptation histories of airsick individuals, and relationship between degree of airsickness and performance degradation and/or attrition.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Aerospace Medical Research Lab.

6.0009, EVALUATE THE NUTRITIONAL VALUE OF 'SINGLE CELL PROTEIN' USING WATER HYACINTH EXTRACTS AS SUBRATE STUDY

P.K. STOCKS, Univ. of Southern Mississippi, School of Science & Technology, Microbiology, *Hattiesburg, Mississippi* 39401 (NAS13-81)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0010, SPACE FLIGHT ASSOCIATED ALTERATIONS IN ERYTHROCYTE MEMBRANES

S.A. LANDAW, State University of New York, School of Medicine, *766 Irving Ave., Syracuse, New York* 13210 (NCA 2-765801)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0011, FOOD AND FIBER INFORMATION EVALUATION STUDY

L. EISGRUBER, Oregon State Higher Educ. Sys., School of Agriculture, Agricultural Econ, *126 Agriculture Hall, Corvallis, Oregon* 97331 (NAS 9-15547)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0012, DEVELOPMENT OF SPACE BIOPROCESSING SYSTEM

L.K. NYIRI, Lehigh University, School of Engin. & Phys. Sci., Chemical Engin, *Alumni Memorial Bldg., Bethlehem, Pennsylvania* 18015 (NAS 9-15619)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0013, PURIFICATION AND CULTIVATION OF HUMAN PITUITARY GROWTH HORMONE SECRETING CELLS

W.C. HYMER, Penn. State University, School of Science, Biology, *211 Whitmore Lab., University Park, Pennsylvania* 16802 (NAS 9-15566)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0014, KIDNEY CELL ELECTROPHORESIS

P.W. TODD, Penn. State University, School of Science, Biochemistry & Biophysics, *211 Whitmore Lab., University Park, Pennsylvania* 16802 (NAS 9-15584)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0015, DEVELOPMENT OF MICROPROCESSOR-CONTROLLED LOWER BODY NEGATIVE PRESSURE (LBNP) SYSTEM

R.J. GOWEN, South Dakota School of Mines, Graduate School, *Rapid City, South Dakota* 57701 (NAS 9-15522)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0016, MASS DISTRIBUTION CHARACTERISTICS OF LIVING HUMAN BEINGS

R.E. HERRON, Baylor College of Medicine, School of Medicine, *1200 Moursund Ave., Houston, Texas* 77025 (DF320390; F33615-76-C-0529)

The goal of this effort is to describe the variability of mass distribution characteristics of Air Force men for providing design criteria for analogues of the human body. These analogues are used to assess man's reactions to hazardous environments, e.g., impact, ejection, and to evaluate systems to protect man against such environments.

Stereophotographs will be made of a sample of 30 males selected to represent the body-size distribution of the Air Force population. From the stereophotographs, the weight, volume, location of the center of mass, and moments of inertia about the principal axes of inertia of the body and its major segments will be assessed. The relationships between these parameters and the anthropometry of the subjects will be established from which population statements will be formulated to serve as design criteria for human analogues.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Labs.

6.0017, EFFECTS OF HYPOGRAVITY ON RESPIRATION AND PHOTOSYNTHESIS OF HIGHER PLANTS

C.H. WARD, Rice University, Graduate School, Biology, *6100 Main St., Houston, Texas* 77001 (NASW 3164)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

6.0018, PANORAMIC RADIOGRAPHY AS A DIAGNOSTIC TOOL

B.R. ALTSCHULER, U.S. Air Force, School of Aerospace Med., *Brooks A.F.B., San Antonio, Texas* 78235 (DF312120)

To investigate methods to improve diagnostic image quality of roentgenographic view to enhance early discovery and measure extent and progress of oral diseases related to the aerospace environment, and thereby increase the probability of early diagnosis and treatment of oral malfunctions in air crewmembers.

Measure alveolar bone height and density of air crewmembers and RPWS as part of their physical examination at the School of Aerospace Medicine in an attempt to identify periodontal disease and generalized osteoporosis. Evaluate methods to reduce irradiation to oral structures by (a) studying electrooptic instrumentation for precise placement of x-ray emitters and sensors, (b) developing a standardized method for scientific comparison of density, configuration, and alterations of oral structures seen in long-term periodic studies (such as RPW study), and (c) studying electrooptic and data handling methods to improve images and thereby reduce patient exposure requirements.

ADDENDA: Supporting agency address is: USAF School of Aerospace Medicine NG, Brooks AFB, Texas 78235

SUPPORTED BY U.S. Dept. of Defense, Air Force

6.0019, REHABILITATION OF AIRSICK AIR CREWMEN

H.H. HANNA, U.S. Air Force, School of Aerospace Med., *Brooks A.F.B., San Antonio, Texas* 78235 (DF321950)

To determine the value of a specific rehabilitative effort in aircrewmen with chronic airsickness of such severity as to warrant suspension.

Each air crewman referred to USAFSAM for airsickness will receive the standard aeromedical evaluation. If no organic basis

for the airsickness can be found and the patient has no significant psychiatric condition, he will be considered suitable for rehabilitation. With the subject's concurrence, he will then receive self-paced incremental coriolis stimulation (usually twice a day) and psychotherapy (reciprocal inhibition), usually for ten working days. Upon completion of rehabilitation, the subject will return to his duty station with the recommendation that he be returned to flying duties on a trial basis to see if he has benefitted sufficiently to perform adequately in his assigned aircraft. This work was formerly documented under 7755-08-04.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0020, DURATION TESTING OF MA-1 CYLINDER ASSEMBLIES

R.D. HOLDEN, U.S. Air Force, School of Aerospace Med., *Brooks A.F.B., San Antonio, Texas* 78235 (DF323870)

Duration values for Air Force type MA-1 portable oxygen system as given in current USAF technical orders are not consistent. Oklahoma City, ALC has requested a formal test of system duration to reduce confusion and improve confidence in published values. A formalized test program has been prepared to obtain reliable duration values for the oxygen system in both normal and emergency operational situations. Navigator and load master activities will be used as guidelines to provide a range of user demand for system duration tests. The experimentally determined durations will represent realistic times conforming to actual Air Force aircraft operations.

Phase I: to establish duration limits for MA-1 portable oxygen systems, appropriate minute ventilation requirements must be determined for specific operational conditions. No inflight respiratory data have been acquired to date from navigators or loadmasters so workloads ranging from light to moderately heavy will be imposed on human volunteer subjects at ground level to simulate duties of the navigator checking computations and loadmaster checking security of cargo in a large cargo type aircraft. Minute ventilation levels obtained from human subjects at ground level will then be used to set a mechanical breathing simulator to 'breathe' at appropriate tidal volumes and respiratory frequencies at the various test altitudes. Test altitudes will range from ground level to 45,000 ft and initial cylinder pressure will be either 450 psi or 300 psi to represent both gaseous and liquid aircraft oxygen refilling pressures. Phase II: inflight ventilation requirements for navigator and loadmaster personnel involved in normal operational duties will be determined. The 'inflight physiological data acquisition system' of VNE will be utilized in discerning minute ventilation of crew members during actual aircraft mission. Actual cylinder durations of the MA-1 assemblies will then be redetermined using the mechanical breathing simulator and oxygen regulator test stand as specified in Phase I. Comparison of obtained data can then be used to test the accuracy of simulated data. A final report will then be prepared evaluating test methodologies and procedures and providing a table of realistic duration values for the MA-1 assemblies.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0021, DEVELOPMENT OF A READING ABILITIES TEST FOR AF PERSONNEL

J.J. MATHEWS, U.S. Air Force, Human Resources Laboratory, *Brooks A.F.B., San Antonio, Texas* 78235 (DF232980)

To develop, validate and norm two forms of a standardized diagnostic reading/comprehension test. The target population will include enlisted, officer, and civilian AF personnel. The test will be cross-referenced with several commercial instruments. The stability of reading skill improvements overtime will be assessed. This work, in part, supports an AF/DA program to make Air Force publications more comprehensible.

Technically-oriented, multiple-choice test items will be developed and pre-tested. Separate scales for comprehension, vocabulary, and interpretation or generalization will be devised. Two levels of the test may be needed to cover the range of abilities in the population. One would be a high school version with a reading grade level (RGL) average of about 11 and a range of 4 to 14. This would be appropriate for most enlisted personnel. A college version would have an average RGL of about 14 and a range of 9 to 17. This would be appropriate for measuring officers' RGLs. Initial RGL estimates of enlisted personnel will be based on commercial tests and ASVAB scores. Preliminary data will also be obtained for officers on a commercial test. The AF reading test developed will be validated against technical training and officer training programs. Norms will be developed from cross-sections of enlisted, officer, and DAF civilian personnel. Reading evaluations will be performed for BMT remedial reading classes and comparisons will be made between RGLs of airmen in BMT and at two- and four-year points of initial service. Milestones: reading test item development, 1 Apr 77, 1 Nov 77, obtaining commercial tests, 1 May 77-1 Oct 77, testing on commerical tests, 1 Oct 77-1 Jan 78, AF test assembly and printing, 1 Oct 77-1 May 78, commercial test-ASVAB analysis, 1 Jan 78-1 Mar 78, draft first tech report, 15 Feb 78-1 May 78, AF test validation, 1 May 78-1 Dec 78, AF test norming, 1 May 78-1 Apr 79, BMT reading evaluation, 1 Jan 78-1 Mar 79, 2-yr, 4-yr reading evaluation, 1 Jun 78 -1 May 79, draft final tech report, 1 Mar 79-1 Sep 79.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0022, VITAMIN D METABOLITES AND BONE DEMINERALIZATION

H.K. SCHNOES, Univ. of Wisconsin, School of Agric. & Life Sci., Biochemistry, *Agriculture Hall, Madison, Wisconsin* 53706 (NAS 9-15580)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, CIG OVERLOAD ALGORITHM

R.W. RIFE, U.S. Air Force, Human Resources Laboratory, *Williams A.F.B., Chandler, Arizona* 85224 (DF223510)

To develop an overload algorithm (especially an overload anticipation scheme) which will allow a non-distracting degradation of the visual scene when flying the ASPT simulator through a dense environment.

When lessening the detail of the CIG visual scene is necessary to prevent the special purpose computer from overloading, it is desirable to lessen the detail in a systematic and nondistracting (to the pilot) fashion. Moreover, it is desirable to be able to anticipate the overloading by monitoring some key parameters, so that the proper detail-lessening routine can be started in time to prevent overload. The key parameters and their correlations to overload counts must be identified. Data recordings of all possible key parameters will be taken at 30/sec rate while flying prerecorded demos through the various environments (data bases) which will be created. Statistical analysis will be done on the possible key parameters to hopefully identify any key parameters. An overload detection (anticipation) algorithm will be written based on the findings of the statistical analysis, then more data recordings will be taken while flying the demo's through the environments and more analysis will be done. Various overload detection schemes may be written and compared by both objective analysis of the data recordings and subjective examination of the visual scene.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

7.0002, ANALYSIS OF SELECTED DIGITAL MAG TAPES TO DETERMINE ERRORS OVER TRANSMISSION CHANNEL

UNKNOWN, Calif. State Univ. & Colleges, Graduate School, *1811 Nordhoff St., Northridge, California* 91326 (NAS 5-24436)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

7.0003, LEAST SQUARES SOLUTION OF NON-LINEAR PROBLEMS IN FLUID DYNAMICS
G.H. GOLUB, Stanford University, School of Hum. & Sciences, Computer Sci, *Palo Alto, California* 94305 (NCA 2-745816)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

7.0004, DESIGN AND IMPLEMENTATION OF AN INTERACTIVE COMMAND LANGUAGE FOR EXISTING BATCH IMAGE PROCESSING SOFTWARE
R.L. DANIELSON, Univ. of Santa Clara, School of Engineering, Electrical Engin, *Santa Clara, California* 95053 (NCA 2-685810)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

7.0005, TRANSFER OF IMGRID SOFTWARE FROM CYBER 74 SYSTEM TO THE UNIVAC 1108 AND IMPLEMENT THE LINEAR FEATURE SELECTION SOFTWARE
N.L. FAUST, Georgia Inst. of Technology, Graduate School, *225 North Ave. N.W., Atlanta, Georgia* 30332 (NAS13-84)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

7.0006, COMPUTER PROGRAMS FOR FLIGHT VEHICLE SYNTHESIS
H.H. HILTON, Univ. of Illinois, School of Engineering, Aeronautical & Astronaut Engin, *2527 Hydrosystems Lab., Urbana, Illinois* 61801

An overall systems concept utilizing an integrated approach incorporating basic aerodynamic, guidance, control, propulsion, and structural principles is being used to develop comprehensive, generalized simulation computer programs for flight vehicle synthesis. The purpose is to develop an educational tool to be used in the teaching of flight vehicle synthesis and optimization. Current capabilities include space vehicle flight programs, airplane missions, various structural programs to determine minimum weight and optimum construction, and printed and teletype graphical output on Calcomp.

Accuracy requirements for computerized synthesis were developed and an examination of estimation errors for two actual airplanes was undertaken by performing computational designs on two existing general aviation computer programs.

In addition, an error analysis was formulated for the determination of aircraft weight estimation accuracy sensitivity to possible errors in aerodynamic, weight and mission performance computerized synthesis analyses. Necessary computational time and implied design costs are also examined in relation to design accuracy in terms of computational iterative tolerances and the number of iterations necessary for achieving prescribed accuracies. A two-step approach was devised with initial large and subsequent fine tolerances, which assures the desired accuracy with substantial decreases in computational time and associated cost.

SUPPORTED BY University of Illinois

7.0007, SOME ALGORITHMIC PROBLEMS IN LINEAR SYSTEMS
A.G. LINDQUIST, Univ. of Kentucky, School of Arts & Sciences, Mathematics, *Limestone & Euclid, Lexington, Kentucky* 40506 (DF050650; AF-AFOSR-3519-78)

AF function - the design of control systems for high-performance aircraft. Deficiency - the design of a linear control system is indeed a straightforward task. However, the design of a nonlinear system which has parameter uncertainty in addition to operation over deverse flight regimes is by no means simplistic and no effective means is available to do this task. Objective - the objective of this research program to develop a system of reduced-order equations which can be used to construct methods which are invariant under different choices of stochastic realization, while retaining the convenient Kalman-Bucy pecursions. How work contributes - success here would reduce the overall design time in control system implementation.

Research will proceed in four areas. First, the reduced-order equations will be investigated to determine if the theory of invariant directions applies. The impetus will be to reduce the number of equations further. Second, a spectral factorization method and the reduced-order algorithm will be applied to the stochastic realization problem. Third, an investigation will be pursued of whether the canonical transformation in Hamiltonian systems as applied to the matrix Riccati equation can be utilized on the reduced-order algorithm. Finally, the relations between the reduced-order algorithms and stability of time-invariant linear systems will be pursued.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0008, A SPLIT FINITE-ELEMENT ALGORITHM FOR THE COMPRESSIBLE NAVIER-STOKES EQUATIONS
A.J. BAKER, Univ. of Tennessee, Graduate School, *W. Cumberland Ave. S.W., Knoxville, Tennessee* 37916 (NSG 1529)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

7.0009, AIRCRAFT/STORE DATA MANAGEMENT
H. KAUPP, Arnold Research Org. Inc., *Tullahoma, Tennessee* 37389 (DF421052; F40600-77-C-0003)

To implement a computerized data management system for storage and retrieval of aircraft/store aerodynamic data.

Aircraft/store aerodynamic data and related information will be collected and stored to initiate system operation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Arnold Engineering & Development Center

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, EXPERIMENTAL AND THEORETICAL STUDIES OF LATTICE DYNAMICS
J.B. PAGE, Arizona State University, School of Liberal Arts, Physics, *Tempe, Arizona* 85281 (DMR77-06809 A01)

Continuation of research supported by DMR 75-10414.

The research proposed consists of a number of experimental and theoretical projects in the following four areas: (1) High-pressure Brillouin scattering studies of molecular crystals, particularly the disordered-partially ordered phase transitions in KCN and NaCN. (2) Correlation spectroscopy studies on biological systems, concentrating on diffusion of macromolecules, reorientation phenomena of lattice defects possessing electric and elastic dipoles, and elementary excitations in an analog of the Wigner crystals. (3) Theoretical studies of the anharmonic properties of very low frequency impurity-induced phonon resonances. The initial concern will be anharmonic effects on defect-host coupling and isotopic frequency shifts. Effects of temperature, applied stresses and applied electric fields will then be studied. An investigation of defect-induced ferroelectric phase transitions will also be made. (4) Impurity-induced resonance Raman scattering. The general theory of resonance Raman scattering from impurities having strongly phonon-broadened electronic absorption bands will be studied with respect to the validity of the Born-Oppenheimer and Condon approximations. Ab initio calculations of F center electron-phonon coupling coefficients will be carried out and used as a basis for calculating K band, L band and multi-phonon contributions to the Raman spectra. Studies will also be made of resonance Raman scattering from

systems having well-resolved vibronic structure in the optical absorption bands.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0002, GENERAL RELATIVITY AND COSMOLOGY
R.K. SACHS, Univ. of California, School of Letters & Science, Mathematics, *Berkeley, California* 94720 (PHY77-15191 A01)

Research in mathematical relativity and cosmology initiated under NSF grants MCS76-21525 and PHY76-08961 will be continued. Topics to be investigated include: 1. Structure of spatial infinity (Hansen), 2. H-space (Hansen), 3. Homogeneous cosmological models (Bachs), 4. Study of generic singularities in relativity (Tipler), and 5. Cosmic censorship hypothesis (Tipler).

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0003, ENGINEERING RESEARCH INITIATION - THEORETICAL INVESTIGATIONS OF RECOMBINATION CENTERS IN SEMICONDUCTORS
D. PAN, Univ. of California, Graduate School, *405 Hilgard Ave., Los Angeles, California* 90024 (DMR78-05783)

This research will be a detailed theoretical investigation of two important problems about recombination centers in semiconductors. The first system which will be investigated is the hole recombination center of the two-electron impurity state of oxygen in gallium phosphide. The role of a complex structure, formed after the capture of the hole and before the recombination, will be studied in detail. The ground and excited states of this complex are of importance to determine various recombination mechanisms of quite different physical origin. Those states will be first studied in detail. The Auger recombination rates for those states will then be calculated. The recombination cross section will be calculated in a cascade model. The result may shed new light about the mechanism of recombination centers which have many important technical applications. The second system to be investigated is the zinc-oxygen center in gallium phosphide light emitting diodes (GaP LEDs). Various electronic states bound to Zn-O center will first be investigated. The potential energy as a function of the positions of Zn and O will be calculated in a simple model for various electronic states. The rate of 'dissociation' of the Zn-O pair will be estimated in a way similar to the theory of pre-dissociation of molecules.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0004, PSEUDOPOTENTIAL METHODS IN PHYSICS
W.A. HARRISON, Stanford University, Graduate School, Applied Science, *Palo Alto, California* 94305 (DMR77-21384)

This is a continuation of research previously supported under DMR-7302351. Theory relating the electronic structure of solids to the dielectric and bonding properties of those solids will be developed. A systematic set of matrix elements for transition-metal solids, analogous to those for simple solids, will be derived from the known electronic structure of a number of such systems. Calculations of various properties will be carried out in terms of these parameters. Also, elementary LCAO theory will be applied to covalent and ionic solids.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0005, TIME PROJECTION CHAMBER - DRIFT CHAMBER CONSTRUCTION, SUPPLEMENT TO 'HIGH-ENERGY PHYSICS'
A. KERNAN, Univ. of California, School of Natural & Agric. Sc., Physics, *Riverside, California* 92502 (EY-76-S-03-0034-107)

The UCR High Energy Physics Group is responsible for the design and construction of the trigger system of the Time Projection Chamber Facility at PEP. The trigger system comprises a four-layer cylindrical drift chamber system for the innermost portion of the TPC and a cylindrical drift chamber system consists of four layers of sixty cells each and operates inside the same argon-methane gas volume as the Time Projection Chamber. The small cells have a maximum drift time of 130 nsec. and spatial resolution of approximately 100 microns. The position information in the axial direction is obtained from induced pickup on printed delay lines inserted in the inner and outer layers of the array. The outer drift chamber system has a total of 500 cells and operates in its own gas volume. The small cell size is mandatory if the outer drift chamber is to be included in the trigger requirement. The coincidence of fast signals from neighboring cells in successive layers of the inner drift chamber system serves as an effective single particle trigger with a desired pT cut off. The coincidence of the signals from inner and outer drift chambers can be required to greatly reduce the background rate. We propose to complete the initial design of the drift chamber systems. Prototype chambers will be constructed and tested.

RESULTS: Design of the inner drift chamber system is in progress. Two prototype chambers for the inner drift chamber system are being built. Electrical and mechanical properties of these prototype chambers will be studied.

SUPPORTED BY U.S. Dept. of Energy, Div. of High Energy & Nuclear Physics

8.0006, GENERAL RELATIVITY AND RELATIVISTIC ASTROPHYSICS
J.B. HARTLE, Univ. of California, School of Letters & Science, Physics, *Santa Barbara, California* 93106 (PHY78-09620)

Research in gravitation theory supported under NSF Grant PHY76-08551 A01 will be continued. Among the topics to be investigated are: 1) Particle production in the early universe. This process is the most promising mechanism to explain the large scale homogeneity and isotropy of the universe, and the observed photon to baryon ratio. 2) Black holes and gravitational collapse: They may explain the enormous energies necessary for the activity of quasars and galactic nuclei. 3) Relativistic stellar structures: Studies will concentrate on the possible end states of stellar and galactic evolution associated with rapidly rotating objects.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0007, INHOMOGENEOUS AND ANISOTROPIC SYSTEMS
D.W. HONE, Univ. of California, School of Letters & Science, Physics, *Santa Barbara, California* 93106 (DMR78-05926)

Research previously supported by DMR7302691.

Theoretical research in condensed matter physics will be carried out. The types of materials which will be studied will include lower dimensional magnetic crystals, pure and impure exchange coupled paramagnets, and surfaces. A major motivating factor will be the direct comparison with experiment, such as the interpretation of proton spin-lattice relaxation in tetramethylammonium manganese chloride in terms of a symmetry crossover phenomenon. The work on surfaces will be focussed on exploring charge exchange scattering and related problems on the charge states of protons driven through thin films of atoms sputtered from surfaces. Also, resistance fluctuations in thin metal films and inelastic electron tunneling will be studied. Continuing investigations of correlated atomic motion in high temperature paramagnets and superionic conductors will be pursued.

This research program is aimed at increasing our understanding of the behavior of a wide range of phenomena in a number of technologically interesting materials.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0008, INTERACTIONS OF ELECTRONS WITH SINGLE CRYSTALS
P.E. BEST, Univ. of Connecticut, Graduate School, Physics, *Storrs, Connecticut* 06268 (DMR76-80211)

A study of the interactions of electrons with single crystals of silicon and of palladium, using angular dependent electron spectrometry will be carried out. The study of the silicon (111) 7 x 7 surface previously supported by NSF grant DMR-7422136 will be

extended to higher energies, where the L2,3 core excitation and LVV Auger spectra will be measured with high-resolution angular-dependent electron spectrometry. The possible benefits of this work include: the identification of a surface core-state exciton for silicon, the observation of the binding energy of the L2,3 level of surface atoms relative to that of bulk atoms, measurement of the shape of the conduction band probed in the L-state excitation, and the comparison of the shape of Auger spectra from bulk and surface atoms, respectively.

The second part of the study will be of inelastic low-energy electron diffraction (ILEED) and energy and angular dependent secondary electron emission (EADSEE) from the palladium (100) surface. This work should provide information about the electronic structure of this surface, as well as probing details of the electron-crystal interaction. Specifically, measurements of k-dependent mean-free-paths will be made and information relating to the transmission coefficient for electrons crossing the surface barrier will be gathered.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0009, NUCLEAR STRUCTURE AND REACTION MECHANISMS

A. SCOTT, Univ. of Georgia, School of Arts & Sciences, Physics, *Athens, Georgia* 30602 (PHY78-07755)

A series of experiments dealing with inelastic proton-nucleus scattering will be carried out at several medium-energy physics laboratories including the Clinton P. Anderson Meson Physics Facility (LAMPF) and the Indiana University Cyclotron Facility. Cross sections for some simple nuclear transitions will be measured using unpolarized beams and asymmetries in cross sections will be determined using newly developed polarized beams at these facilities. The experiments performed will help determine the dominant reaction mechanisms in proton-nucleus inelastic scattering and the energy dependence of these mechanisms with the overall aim of obtaining detailed nuclear structure information. Experiments on inelastic heavy ion-nucleus scattering are also proposed to study the interference between coulomb and nuclear effects in attempts to learn about the matter distributions within nuclei.

This is the continuation of work supported by Foundation Grant PHY76-08788 A01.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0010, QUANTUM LIQUIDS IN TWO AND THREE DIMENSIONS

J.M. MOCHEL, Univ. of Illinois, School of Liberal Arts & Sci., Physics, *Urbana, Illinois* 61801 (DMR78-11538)

This is a continuation of work sponsored under DMR-7203291. An experimental study will be made of 4He between 10mK and 1K. An investigation of the properties of ultra thin films will be made by means of third sound resonance. The behavior of surface impurities of 3He as a two-dimensional Fermi gas, using the closed surface of 4He films as the substrate, will be studied. A new method of time-of-flight phonon spectroscopy in bulk 4He both with and without 3He impurities will be examined. This work is important to understanding the physics of quantum fluids.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0011, ION IMPLANTATION DOPING OF SEMICONDUCTORS

B.G. STREETMAN, Univ. of Illinois, School of Engineering, Coordinated Science Lab, *2527 Hydrosystems Lab., Urbana, Illinois* 61801 (DAAB-07-72-C-0259)

The goals of this research are to better understand implantation doping as currently used in semiconductor device fabrication, and to extend implantation to new impurities and materials which have promise for future device applications. In view of these objectives, we study effects such as impurity distributions, electrical activation, and recrystallization properties in Si, and explore implanted dopants in compound semiconductors which cannot conveniently be introduced by traditional diffusion methods. This research involves development of appropriate post-implantation annealing techniques, including proper encapsulation methods for annealing III-V compounds, measurement of basic semiconductor properties in implanted layers, and studies of implanted junction devices. Measurements include photoluminescence, differential Hall effect and resistivity, C-V analysis, glow discharge optical spectroscopy, and (in collaboration with other groups) secondary ion mass spectrometry, Auger electron spectroscopy, and Rutherford backscattering analysis.

SUPPORTED BY U.S. Dept. of Defense, Army

8.0012, COLLECTIVE PHENOMENA AND ASSOCIATED PARTICLE-CORE COUPLING IN MASS-100 NUCLEI

P.C. SIMMS, Purdue University, School of Science, Physics, *Executive Bldg., Lafayette, Indiana* 47907 (PHY77-12610 A01)

This program combines experiment and theory to study the structure of transitional nuclei with roughly 100 nucleons. Excitation energies and gamma-ray decay properties of high spin states excited in heavy ion induced evaporation reactions are determined using coincidence techniques, as well as the Doppler shift alteration method. Theoretical predictions based on the interaction of one, two, or three quasiparticles with slightly deformed rotating cores are reasonably consistent with data at hand on isotopes of palladium, cadmium, and silver. Further experimental work is planned on selected nuclei in this mass region. Refined theoretical work will be done which includes effects due to the variable moments of inertia of the core, as well as ellipsoidal deformations of the core.

This work is a continuation of work supported by grant PHY73-04914 A02.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0013, SCATTERING AND THE N-BODY PROBLEM IN QUANTUM MECHANICS

C. VANWINTER, Univ. of Kentucky, Graduate School, Physics, *Limestone & Euclid, Lexington, Kentucky* 40506 (MCS78-02661)

This work continues that done under MCS76-07300.

Van Winter will continue her study of multi-channel scattering by analytic potentials. Results indicate that the resolvent of an analytic continuation of the Hamiltonian is a bounded operator on a certain weighted Hilbert space. From this it follows that projections onto certain invariant subspaces of the Hamiltonian can be expressed in terms of wave operators. Van Winter will investigate the analytic continuations of wave operators and projections to the physical region. This will help solve open problems in asymptotic completeness. A theorem by Van Winter enables an anaytic function satisfying and a dispersion relation to be constructed explicitly from its values on part of the boundary of its domain. She will apply this result to analytic scattering amplitudes. In addition to the construction procedure, this will give new sum rules connecting scattering data in different regions of the energy and momentum-transfer variables. It will lead to a better understanding of duality, possibly to new parameter representations relating resonances to Regge asymptotic behavior. In combination with crossing, it yields a new bootstrap scheme.

The Mellin transform yields a representation of quantum mechanics in which the dimension is a dynamical variable. In many cases, the Hamiltonian can be continued analytically in the dimension to yield a family of Hamiltonians that may differ in the range and in any singularities of the interaction. Van Winter will investigate how the spectral properties of the Hamiltonian change under the continuation. Special phenomena are expected in the case of long-range interactions.

SUPPORTED BY U.S. National Science Foundation, Div. of Mathematical & Computer Sciences

8.0014, CRYSTAL NUCLEATION IN GLASS-FORMING ALLOY AND PURE METAL MELTS UNDER CONTAINERLESS AND VIBRATIONLESS CONDITIONS
D. TURNBULL, Harvard University, School of Engineering, Engineering & Applied Physics, *Cambridge Station, Cambridge, Massachusetts* 02138 (NAS 8-32691)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

8.0015, PARTICLE THEORY
H. CHENG, Mass. Inst. of Technology, School of Science, Mathematics, 77 *Massachusetts Ave., Cambridge, Massachusetts* 02139 (PHY78-07450)

Research will be done in theoretical physics to further our understanding of the elementary particles. In particular, research of the group will be directed toward gauge field theories. Particular emphasis will be placed on problems of high-energy scattering and on the role of gauge theories in quark and color confinement.

This work is a continuation of that currently supported under NSF Grant PHY76-12396 A01.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0016, RESEARCH STUDY - GROWTH OF SOLID SOLUTION SEMICONDUCTORS
A.F. HITT, Mass. Inst. of Technology, Graduate School, 77 *Massachusetts Ave., Cambridge, Massachusetts* 02139 (NAS 8-32994)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

8.0017, THEORY OF QUANTUM FLUIDS
C.E. CAMPBELL, Univ. of Minnesota, Inst. of Technology, Physics & Astronomy, *105 Morrill Hall, Minneapolis, Minnesota* 55455 (DMR78-09226)

Research previously supported by DMR7614777.

Theoretical research in condensed matter physics will be carried out. The emphasis will be on the study of quantum fluids, with the aim of understanding their properties from a fundamental point of view.

The research will include: the structure and dynamics of liquid helium-four; the normal and pair-condensed phases of liquid helium-three; the liquid phase and lattice gas phases of adsorbed quantum fluids; the energy and structure of neutron and nuclear matter; the phase separation and spinodal decomposition of helium-three/helium-four mixtures; and the frequency dependence of the Raman scattering and fourth order dynamic structure function of room temperature argon gas.

The predominant theoretical approach will be the method of correlated basis functions and generalizations of Jastrow theory. In the systems to be studied, the most reliable interparticle potentials will be used, with a heavy emphasis on short-range correlations.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0018, PROBLEMS IN PLASMA ASTROPHYSICS
R.M. KULSRUD, Princeton University, Plasma Physics Laboratory, *Box 430, Princeton, New Jersey* 08540 (AST76-80800 A01)

The topics to be investigated involve the application of plasma physics to astrophysical problems. Problems to be studied include the theory of the escape of cosmic rays from supernovae, the analysis of other possible sources of cosmic rays such as rotating white dwarf stars, conditions under which the breaking and reconnection of magnetic lines of force may occur in highly conducting fluids, the pulsar origin of cosmic rays, stochastic acceleration of charged particles by hydromagnetic turbulence, theories of cosmic ray propagation, and the origin of interstellar scintillations.

This is a continuation of work previously supported by NSF Grant AST 76-80800.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

8.0019, PLASMA PROPERTIES--EXPERIMENTAL
H. DREICER, U.S. Dept. of Energy, Los Alamos Scientific Lab., *P.O. Box 1663, Los Alamos, New Mexico* 87545 (00002149)

The research program of the LASL experimental plasma physics groups is devoted to studies in several plasma physics areas that provide scientific information for thermonuclear plasma confinement experiments. During the past several years this program dealt primarily with the plasma ac electrical resistivity and plasma heating produced by the application of high-frequency electromagnetic radiation to fully ionized plasmas. This research produced published research results in three research categories: (1) plasma properties equilibrium, stability and transport; (2) plasma production and heating; (3) plasma measurements and instrumentation. The information and expertise developed in these categories have laid the groundwork for studies in several crucial areas. The first of these, the experimental study of enhanced AC electrical resistivity due to controlled levels of ion density fluctuations, is already underway. This work is to be followed by an experiment to enhance the DC electrical resistivity by artificially produced levels of ion density fluctuation.

SUPPORTED BY U.S. Dept. of Energy

8.0020, HIGH-RESOLUTION OPTICAL MEASUREMENTS, ATOMIC HYPERFINE STRUCTURE AND ISOTOPE SHIFT
H.H. STROKE, New York University, School of Arts & Sciences, Physics, *421 1ST Ave., New York, New York* 10012 (PHY76-21099 A01)

High-resolution measurements of the optical spectrum of the atom are used to study the magnetic and electric structure of the nucleus. The great sensitivity of the optical techniques (combinations of 30-ft focal length monochromators, optical-pumping, level-crossing, Zeeman-scanning, atomic-beam and tunable laser spectrometers, several of which are under development) allow work with microscopic samples of material (less than 1 nanogram, and potentially several orders of magnitude less). Systematic isotopic studies are thus made possible over extensive mass-number ranges (for mercury-24), including short-lived radioisotopes and nuclear isomers. The results are shedding light on the electric charge radius variations and on nuclear deformations, and their relation to the nuclear ground-state energy and nucleon interactions. Effects of the pion exchange contribution to the nuclear magnetic moment are also being studied; the data are expected to reveal their importance in relatively simple cases.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0021, ADVANCED TECHNIQUES IN ATOMIC PHYSICS
H.J. METCALF, State University of New York, School of Arts & Sciences, Physics, *Stony Brook, New York* 11790 (PHY77-26991)

A research program will continue in experimental atomic physics which currently has three major experiments in various stages of progress: The first is a measurement of the Lamb shift in doubly ionized lithium. Extensions of this work include studies of higher n-states of hydrogen-like lithium, application of the separated oscillating fields techniques to the present measurement, and measurements in the isotope Li7.

The second major experiment, which has also already begun, is a precision measurement of the fine structure in n equals 3 helium. Extensions of this work include singlet-triplet transitions and spectroscopy of highly excited states.

The third major experiment, which is also in progress, is a study of fluorescence from the OH free radical. The lifetimes and g-factors of individual rotational excited states have been measured. Extensions include RF spectroscopy of both ground and excited states, two-photon spectroscopy, the isotopic species OD, and superradiance and other cooperative phenomena.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0022, SECONDARY ELECTRON EMISSION YIELD
W.L. GORDAN, Case Western Reserve Univ., Graduate School, *2040 Adelbert Rd., Cleveland, Ohio* 44106 (NSG 3197)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

8.0023, SURFACE TENSION DRIVEN CONVECTION PHENOMENA EXPERIMENT
S. OSTRACH, Case Western Reserve Univ., School of Engineering, Engineering, *University Cir., Cleveland, Ohio* 44106 (NAS 8-33015)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

8.0024, NUCLEAR PHYSICS RESEARCH WITH A 7 MEV VAN DE GRAAFF ACCELERATOR
H.J. HAUSMAN, Ohio State University, School of Math. & Phys. Scis., Physics, *164 W. 17th Ave., 102 Administration Bldg., Columbus, Ohio* 43210 (PHY77-05021 A01)

This grant will provide funds for operation of the Van de Graaff Laboratory, and nuclear physics research at O.S.U., as well as user-mode research at the Indiana University cyclotron laboratory. The in-house research program is well suited to the facility which contains a seven million volt Van de Graaff accelerator and extensive ancillary experimental apparatus. Techniques which have been developed, or utilized, at Ohio State will be applied to interesting problems which include: the spectroscopy of selected nuclei; the charge independence of the nucleon-nucleon force; the cross sections of nuclear reactions crucial to stellar nucleosynthesis; and atomic ionization phenomena induced by beams of helium isotopes. Much of the work will exploit the high-quality polarized proton or deuteron beams now available.

Research at Indiana on intermediate-energy proton capture reactions is designed to search for high-angular-momentum collective vibrations of nuclei and high-linear-momentum components or low-lying states of nuclei.

This work is a continuation of that currently supported by NSF grant PHY74-08524 A02.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0025, STUDY OF INFRARED DETECTION BY INTRACAVITY UPCONVERSION
J. FALK, Univ. of Pittsburgh, Graduate School, *1028h Cathedral of Learning, Pittsburgh, Pennsylvania* 15213 (NAS 5-25013)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

8.0026, RESEARCH INITIATION FOR MINORITY INSTITUTION IMPROVEMENT - CRYSTAL GROWTH OF MIXED BISMUTH OXIDE LAYER STRUCTURE COMPOUNDS
F.A. DIAZ, Univ. of Puerto Rico, School of Natural Sciences, *Ponce Deleon Ave., San Juan, Puerto Rico* 00931 (SER77-04600)

Mixed bismuth oxide layer structure compounds of the composition Bi2Mn-1RnO3P-3 comprise a large family with interesting ferroelectric and dielectric properties. M can be a combination of ions like Bi ion 3, La ion 3, Y ion 3, Pb ion 2, Ca ion 2, Ba ion 2, K ion, Na ion etc., while R is a corresponding combination of transition element ions such as Fe ion 3, Cr ion 3, Ti ion 4, Nb ion 5, W ion 6 etc. This project is concerned with the preparation of single crystals of mixed bismuthoxide ferroelectric compounds and the measurement of their optical and dielectric properties.

SUPPORTED BY U.S. National Science Foundation, Div. of Science Education Resources Improvement

8.0027, OPTICAL CHARACTERIZATION OF ZERO-GRAVITY GROWN CRYSTALS
E. SILBERMAN, Fisk University, School of Liberal Arts, Physics, *17th Ave. N. & Meharry Blvd., Nashville, Tennessee* 37203 (NSG 8060)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

8.0028, PHASE TRANSFORMATIONS IN TRANSITION METAL HEXACYANIDE COMPOUNDS
W.D. MCCORMICK, Univ. of Texas, School of Natural Sciences, Physics, *200 W. 21st St., Austin, Texas* 78712 (F-610)

The compounds Cs2LiM(CN)6 (M equals Cr, Mn, Fe, Co, Ir) are isostructural (cubic) at high temperature but undergo transitions to lower symmetry phases when cooled. We have measured the heat capacity of an 80 mg crystal of Cs2LiCr(CN)6 with the precision AC calorimeter developed under this grant. We find a sharp change in slope of the heat capacity at 40 degrees C (no hysteresis) and a sharp double peak (with hysteresis) between 79 degrees C and 81 degrees C. Considering also the Raman data we conclude there is 1) a first-order transition (further work will decide if the double peak is due to crystal imperfection) at 80 degrees C associated with librational modes of the Cr(CN)6-3 and 2) a higher order (continuous) transition at 40 degrees C associated with a soft translational mode of the Cs ion.

We have studied the structural phase transition in solid ethane with proton magnetic resonance and cleared up some confusion concerning the phase diagram. We find the melting point at 90.37 plus or minus .05K and a solid-solid transition at 89.72 plus or minus .05K. The upper phase is a plastic crystal with rapid molecular tumbling and diffusion. At lower temperatures precise second moment measurements show a continuous transition between 30K and 40K from tunneling to activated rotation of the molecules about their threefold axes.

SUPPORTED BY Robert A. Welch Foundation

8.0029, TRACE CONTAMINANT COADSORPTION CHARCOAL
UNKNOWN, Rice University, Graduate School, *6100 Main St., Houston, Texas* 77001 (NAS 9-15630)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

8.0030, COMPTON SCATTERINGS OF METAL HYDRIDES WITH 412 KEFY - RADIATION
M.J. COOPER, Univ. of Warwick, Physics, *Cv4 7AL, Coventry, England, United Kingdom* (DA0D9371; DAERO 78 G0019)

An Au 198 gamma ray source is constructed at Rutherford Laboratory. Dr. J. L. Dubard of the U.S.A. is experienced with similar sources and is to spend a sabbatical year in the U.K. assisting in this Au 198 source. The research itself will centre around the sensitivity of the Compton profile to the behavior of hydrogen in metals. The electron momentum density of metals, and particularly metal hydrides, will be measured.

It is anticipated that by using the Au 198 source, two orders of magnitude improvement will be achieved.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Research & Standardization Group

SOCIAL SCIENCES

Includes Social Sciences (general); Administration and Management; Documentation and Information Science; Economics and Cost Analysis; Law and Political Science; and Urban Technology and Transportation.

9.0001, SOCIAL AND ECONOMIC IMPACT STUDY OF PHOTOVOLTAIC POWER
D.M. BAHR, Arizona State University, School of Liberal Arts, Anthropology, *Tempe, Arizona* 85281 (DEN 3 50)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

9.0002, GODDARD INTRODUCTION TO ENGINEERING CAREERS
W.A. WOCKENFUSS, Univ. of Maryland, School of Engineering, Mech Engin, *College Park, Maryland* 20740 (NCA 5-28)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, IMPROVEMENTS TO THE STEWARD OBSERVATORY 90-INCH TELESCOPE
R.L. HILLIARD, Univ. of Arizona, Graduate School, *Tucson, Arizona* 85721 (AST77-27566)

This grant will provide funds for the upgrading of Steward Observatory ninety-inch telescope. The improvements will ensure continued reliable performance and permit adaptation of the telescope to new optical and infrared instrumentation. Improvements will include replacement of the main drive torque motors; replacement of the electronic drive and control systems; refiguring the Cassegrain secondary mirror; construction of an automatic telescope pointing, offsetting and scanning system; construction of a new instrument interface system for Cassegrain observing instruments; establishment of an enlarged telescope control room; and construction of a remote instrument control system.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0002, SEARCH FOR OTHER PLANETARY SYSTEMS IN THE UNIVERSE
K. SERKOWSKI, Univ. of Arizona, Lunar & Planetary Laboratory, *Tucson, Arizona* 85721

The radial velocity meter, invented by the applicant, is in operation on the 154-cm telescope since July 1977. The instrument is used for searching for planets similar to Jupiter around stars similar to the Sun. If such planets have orbital periods as short as several weeks or months they may be detected during the next year. Detection of extrasolar planets would provide an impetus for intensifying a search for signals from civilizations on such planets. Also, it would be a great step towards explaining the origin of planetary systems.

In our radial velocity meter the wavelength calibration for measuring Doppler shifts in stellar spectra is provided by a tiltable Fabry-Perot etalon, kept in vacuum at constant temperature. The stellar brightness at the etalon's transmission maxima, separated by our echelle spectrograph, is measured by a photoelectron counting Digicon image tube.

The requested support is essential for continuation of the project.

SUPPORTED BY National Geographic Society

10.0003, HIGH-ENERGY X-RAY OBSERVATION OF CLUSTERS OF GALAXIES
K.A. ANDERSON, Univ. of California, School of Letters & Science, Physics, *Berkeley, California* 94720 (NAS 8-33011)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0004, DIRECT DETERMINATIONS OF THE DYNAMICAL STRUCTURE AND CHEMICAL COMPOSITIONS OF LOCAL GROUP ELLIPTICAL GALAXIES
H.C. FORD, Univ. of California, School of Letters & Science, Astronomy, *405 Hilgard Ave., Los Angeles, California* 90024 (AST76-21312 A01)

The isolation and study of planetary nebulae are the only present means of directly determining the characteristics of the old stellar populations in galaxies of the Local Group. These characteristics include chemical composition (which gives data on nucleosynthesis in sequential generations of stars) and kinematics (which allows a detailed investigation of the dynamical structure of the galaxies in which the planetaries are found). Precision coordinates for 370 planetary nebulae in the Andromeda galaxy and its companions have been determined. Radial velocities of planetaries in M31 will be used to investigate the dynamical structure of its nuclear bulge. Reduction and analysis of radial velocities already obtained in M32, NGC 205, and M31 will be carried out. A novel technique of using a temperature and tilt controlled 1.5 angstrom bandpass interference filter to take velocity modulated photographs will be used to determine the radial velocities of large numbers of planetaries near and to within 15 parsecs of the nucleus of M31. The Kitt Peak National Observatory (KPNO) Image Tube Image Dissector Scanner on the Mayall 4-m telescope will be used to make spectrophotometric observations of planetary nebulae in NGC 147, M32, and NGC 205. The observations will allow the first direct chemical composition determinations in these galaxies and the data on the abundances will be fundamental for understanding metal enrichment during the formation of galaxies.

This is a continuation of research done under grant AST 76-21312.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0005, THEORETICAL STUDIES OF THE INTERSTELLAR MEDIUM
M.A. JURA, Univ. of California, School of Letters & Science, Astronomy, *405 Hilgard Ave., Los Angeles, California* 90024 (AST75-20355)

Theoretical investigations of the interstellar medium will be carried out. The general aim of this research is to develop a quantitative understanding of the physics and chemistry of diffuse interstellar clouds, and to describe their origin, their evolution into dark clouds and the subsequent processes of star formation. Three specific goals are the elucidation of the heating mechanisms within diffuse clouds, the formation mechanisms of CH ion, and a discussion of high density sheets of atomic hydrogen. Several other questions pertaining to diffuse clouds will also be investigated if the particular research is of importance to understanding problems in astronomy.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0006, AN INVESTIGATION OF THE THERMAL STRUCTURE OF SELECTED DIFFUSE FEATURES IN THE SOFT X-RAY/EUV BACKGROUND HEAO-1
A.B. WALKER, Stanford University, School of Hum. & Sciences, Applied Physics, *Palo Alto, California* 94305 (NAS 8-33012)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0007, SPACE SHUTTLE BASED COMPRESSION STUDIES OF PLANETARY MATERIALS
T.J. AHRENS, Calif. Inst. of Technology, Graduate School, Geological & Planetary Sci, *1201 E. California Blvd., Pasadena, California* 91109 (NSG 7458)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0008, STRATOSPHERIC-MESOSPHERIC DYNAMICS
C.A. RIEGEL, Calif. State Univ. & Colleges, School of Science, Meteorology, *Washington Sq., San Jose, California* 95114 (NCA 2-675809)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0009, MODIFICATIONS OF THE AMES ONE-DIMENSIONAL AND TWO-DIMENSIONAL MATHEMATICAL MODELS OF THE UPPER IONOSPHERE OF VENUS
P.T. MCCORMICK, Univ. of Santa Clara, School of Science, Physics, *El Camino Rd., Santa Clara, California* 95053 (NCA 2-685809)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0010, EVAPORATIVE HEAT LOSS COMPARISONS BETWEEN CALORIMETRY HYGROMETER TECHNIQUES
UNKNOWN, Univ. of Santa Clara, Graduate School, *Santa Clara, California* 95053 (NAS 2-9967)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0011, A STUDY OF STELLAR CORONAE USING THE HEAO-A SPACECRAFT
J.L. LINSKY, Univ. of Colorado, School of Arts & Sciences, Astro Geophysics, *1200 University Ave., Boulder, Colorado* 80302 (NAS 8-33084)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0012, SPACE ENVIRONMENTAL EFFECTS ON HIGH-VOLTAGE SOLAR ARRAYS
H.R. KAUFMAN, Colorado State University, School of Engineering, Mech Engin, *Fort Collins, Colorado* 80523 (NSG 3196)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0013, TRAVEL TO ATTEND 13TH RENCONTRE DE MORIOND, SAVOIE, FRANCE, MARCH 12-24, 1978
G. STEIGMAN, Yale University, Graduate School, Astronomy, *206 Elm, New Haven, Connecticut* 06520 (AST78-13742)

An invited lecture on 'Neutrinos and Cosmology: Astronomy at the Frontier of Physics' will be given at the 13th Rencontre de Moriond at Savoie, France, in March 1978.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0014, MOLECULAR HYDROGEN EXPERIMENTATION - COPERNICUS
J.A. SIMPSON, Univ. of Chicago, School of Physical Sciences, Physics, *5801 S. Ellis Ave., Chicago, Illinois* 60637 (NSG 5291)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0015, RESEARCH IN GALACTIC AND EXTRAGALACTIC ASTRONOMY HEAO-1
M.P. ULMER, Northwestern University, Graduate School, *633 Clark St., Evanston, Illinois* 60201 (NAS 8-33010)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0016, CORRELATED GROUND BASE OBSERVATIONS IN SUPPORT OF THE HEAO-1 X-RAY OBSERVATORY
S.L. MUFSON, Indiana University, Graduate School, *2805 E. 10th, Bloomington, Indiana* 47401 (NAS 8-33087)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0017, STUDY OF THE X-RAY EMISSION FROM A STRONG X-RAY SOURCE
R.C. LAMB, Iowa State Univ. of Sc. & Tech, School of Hum. & Sciences, Physics, *Beardshear Hall, Ames, Iowa* 50010 (NAS 8-33013)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0018, THEORETICAL STUDIES OF THE EVOLUTION OF ROTATING STARS
A.S. ENDAL, Kansas State University, Graduate School, *Anderson Hall, Manhattan, Kansas* 66502 (AST78-08611)

Recent work has shown rotation to be a crucial factor in late stages of stellar evolution. This research will be devoted to a systematic comparison of theoretical models of rotating stars and observations. The principal goals of this investigation will be: (a) a systematic evaluation of the strong and weak points of the theory rotation in stellar interiors; (b) an evaluation of the role of rotationally-induced mixing in determining stellar surface abundances, with primary emphasis on lithium depletion in solar-type stars; and (c) estimates of the effects of magnetically-coupled stellar winds on surface rotation rates and on the rotation of stellar interiors.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0019, STUDY OF DIGITAL IMAGE PROCESSING OF ASTRONOMICAL SCENES
A. ROSENFELD, Univ. of Maryland, School of Engineering, Computer Sci, *College Park, Maryland* 20740 (NCA-5-26)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0020, ULTRAVIOLET SPECTRA STUDY OF NORMAL STARS
R.P. FAHEY, Montgomery College, Undergraduate School, Physics, *51 Mannakee, Rockville, Maryland* 20850 (NAS 5-25120)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0021, RELATIVITY, COSMOLOGY, AND RELATIVISTIC ASTROPHYSICS
W.H. PRESS, Harvard University, School of Arts & Sciences, Physics, *16 Divinity Ave., Cambridge, Massachusetts* 02138 (PHY78-09616)

Theoretical research in gravitational physics currently supported under NSF grant PHY76-14852 A01 will be continued. The Harvard group will carry out a program of research in relativity, cosmology, and relativistic astrophysics. Specific problems which are to be examined include: regularization and renormalization techniques in the quantum theory of gravitation; nonspherical collapse of stars to black holes, and collisions of black holes; dissipative properties of self-gravitating, stellar-dynamic techniques for identifying gravitational radiation in numerical calculations; interaction of gravitational radiation with matter; and other related problems.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

10.0022, ORIGINS OF NEW SOURCES FOUND IN THE AIR FORCE CAMBRIDGE RESEARCH LABORATORY INFRARED SKY SURVEY

S.G. KLEINMANN, Mass. Inst. of Technology, School of Science, Physics, 77 *Massachusetts Ave., Cambridge, Massachusetts* 02139 (AST76-15387)

The Air Force Cambridge Research Laboratory (AFCRL) Infrared Sky Survey covered greater than 70% of the sky with sufficient sensitivity to detect nearly 3,200 sources at 4, 11, and 20 microns. Most of the objects observed at 4 microns can apparently be identified either with sources found in the California Institute of Technology Two Micron Sky Survey, or with fainter, late-type giant stars similar to the majority of the known Two Micron Survey Sources. A large fraction of the 11 and 20 micron sources found by the AFCRL survey cannot be identified with an object from the Two Micron Sky Survey. The relation of these new sources to previously known, well-studied infrared objects is unclear; in particular, it is not known whether some of these new sources represent a new class of astrophysical objects.

A multi-faceted observing program that would systematically survey the AFCRL sources will be carried out. A variety of observational techniques, including multi-color infrared photometry and spectrophotometry, microwave spectroscopy, and optical photography and spectroscopy will be used. The program will lean heavily on the results of current research to verify the new sources reported in the AFCRL survey, and to determine accurate positions for them. Nearly 90 sources have been confirmed. The programs will involve collaborative efforts with astronomers at the University of Arizona, Kitt Peak National Observatory, and the Massachusetts Institute of Technology. The facilities used will include the Catalina Observing Station of the University of Arizona, Kitt Peak National Observatory, Haystack Observatory, and National Radio Astronomy Observatory.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0023, DATA AND OPERATIONS TEAM LEADER FOR THE SPACE TELESCOPE PROJECT

E.J. GROTH, Princeton University, Graduate School, Physics, *205 Nassau Hall, Princeton, New Jersey* 08540 (NAS 5-25084)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0024, CONSEQUENCES OF PAST LUNAR TIDES, HEATING SURFACE PROCESSES AND ORBITAL EVOLUTION

J.A. BURNS, Cornell University, School of Engineering, Theoretical & Applied Mech, *242 Carpenter Hall, Ithaca, New York* 14850 (NSG 7445)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0025, A SEARCH FOR COLLAPSED COMPANIONS AMONG SELECTED OB STARS

R. NOVICK, Columbia University, School of Arts & Sciences, Physics, *Broadway & W. 116th St., New York, New York* 10027 (NAS 8-33085)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0026, X-RAY VARIABILITY OF HIGH GALACTIC LATITUDE SOURCES

B.S. SHEN, Univ. of Pennsylvania, School of Arts & Sciences, Astronomy, *34th & Spruce Sts., Philadelphia, Pennsylvania* 19104 (NAS 8-33088)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0027, THE ALLEGHENY OBSERVATORY TRIGONOMETRIC PARALLAX PROGRAM

G.D. GATEWOOD, Univ. of Pittsburgh, School of Arts & Sciences, Astronomy, *4200 5TH Ave., Pittsburgh, Pennsylvania* 15260 (AST75-02641 A02)

Precision measurement of the parallactic shift for the nearby stars as the earth circles about the sun furnishes the important result of the star's distance and hence its true brightness. Continuation of such measures also reveals the star's motion through space. In addition, for binary stars the stellar masses are determined in favorable cases. These parameters are important results for the physics of the stars.

The Pittsburgh group will continue parallax observations for stars of general interest, brighter than magnitude 16 and north of -20 degrees declination, thought to be within 65 light years of the sun, also some stars of greater distance but of special interest, including those of the Hyades cluster, in an international campaign. In addition, a number of visual and astrometric binaries will be continued under long-term observation. The many requests expected from other astronomers will be processed as rapidly as possible. Further study of ways of improving the precision of observation and reduction will be emphasized. Observations will be made with the Thaw refractor at Pittsburgh and with the 88-inch reflector at high altitude at the Mauna Kea Observatory of the University of Hawaii.

Prior support was by NSF grant AST 75-02641 A01.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0028, HIGH-RESOLUTION SPECTROSCOPY OF LATE-TYPE STARS

D.L. LAMBERT, Univ. of Texas, School of Natural Sciences, Astronomy, *200 W. 21st St., Austin, Texas* 78712 (AST77-23123)

A program of high-resolution spectroscopy of late-type dwarf and giant stars will be carried out. Element and isotopic abundances of major importance in theories of nucleosynthesis will be derived from visible and near-infrared spectra.

The spectroscopic studies of the chemical composition of stellar atmospheres will be devised to test several aspects of the two major nucleosynthesis theories: (i) the internal nucleosynthesis and mixing in red giants and (ii) explosive nucleosynthesis. The spectra of red giant stars will be analyzed to obtain abundances of various chemical elements.

Theoretical predictions will be examined with the abundance data. The predicted changes in surface, composition due to evolution will be compared with the observations of giant stars. In more evolved red giant stars, internal instabilities are predicted. These instabilities can lead to mixing and nuclear processing of material in the envelope of the star. Tests of relevance to this stage of evolution include determinations of the carbon-nitrogen-oxygen abundances in supergiant stars.

The chemical evolution of the galaxy through explosive nucleosynthesis in supernovae will be investigated. Metal abundances in dwarf stars will be studied.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0029, RAPID OPTICAL VARIATIONS FROM COMPACT STARS

R.E. NATHER, Univ. of Texas, School of Natural Sciences, Astronomy, *200 W. 21st St., Austin, Texas* 78712 (AST76-23882 A01)

A program of observations of rapid periodic luminosity variations in white dwarfs will be extended to include other aspects of rapid optical variations from compact objects. Photometric observations will be made of non-periodic variations (with time scales between a few milliseconds and a few minutes) of white dwarf stars and their accretion disks in nova and nova-like variables. Observations will also be made of the periodic optical variations produced by neutron stars in radio pulsars and binary X-ray pulsars. The observational techniques will be extended to include high-speed spectroscopy as well as high-speed photometry. These observations will be carried out in order to obtain information on the observational characteristics of the rapid optical variations of these objects, on the physical mechanism producing the rapid variations, and on the structure of the compact objects.

This is a continuation of work previously supported under NSF Grant AST 76-23882.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0030, DEVELOPMENT AND APPLICATION OF MULTI-CHANNEL DETECTOR SYSTEMS FOR ASTRONOMICAL SPECTROPHOTOMETRY
R.G. TULL, Univ. of Texas, School of Natural Sciences, Astronomy, *200 W. 21st St., Austin, Texas* 78712 (AST77-26402)

An improved astronomical detector system has been developed at McDonald Observatory of the University of Texas in Austin. With this detector, the information rate in high dispersion spectrophotometry at the 107-inch telescope has been increased a hundred-fold. Two additional systems are under construction, to be used at the Coude and Cassegrain foci of the 82-inch and 107-inch telescopes at McDonald Observatory. The Cassegrain spectrograph will be equipped with an integrating TV finding and guiding system. Work will also continue on the development and application of this type of astronomical detector and its minicomputer control system.

Astronomical research using these detectors includes high-dispersion spectra of cool giant and dwarf stars, low dispersion spectra of quasars and cataclysmic variable stars, and the analysis of the atmospheres of planets.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0031, STUDY TO GENERATE MARS SAMPLING REQUIREMENT
J.H. CHALMERS, Baylor College of Medicine, School of Medicine, *1200 Moursund Ave., Houston, Texas* 77025 (NAS 9-15552)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0032, STUDY OF THE SURFACE PHYSICAL PROPERTIES OF MARS
E.A. KING, Univ. of Houston, School of Arts & Sciences, Geology, *3801 Cullen Blvd., Houston, Texas* 77004 (NAS 9-15553)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0033, DEVELOPMENT OF A PROTOTYPE MARS METEOROLOGY STATION
J.E. TILLMAN, Univ. of Washington, School of Arts & Sciences, Atmospheric Science, *C301 Health Sciences Bldg., Seattle, Washington* 98105 (NCA 2-850802)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0034, SPACE TELESCOPE INVESTIGATION USING A HIGH-SPEED PRINTER
UNKNOWN, Univ. of Wisconsin, Graduate School, *500 Lincoln Dr., Madison, Wisconsin* 53706 (NAS 5-24487)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

10.0035, DEVELOPMENT OF INFRARED ARRAY SPECTROMETER SYSTEMS
R.D. GEHRZ, Univ. of Wyoming, School of Arts & Sciences, Physics, *P.O. Box 3435, University Station, Laramie, Wyoming* 82071 (AST76-05039 A02)

Observations at infrared wavelengths in combination with radio, millimeter and optical studies are rapidly adding to our knowledge of a variety of objects in the universe. An array of six infrared detectors has been used to improve the efficiency of observing the inherently weak infrared signals.

A program of further development of array detectors on spectrometer systems will be carried out. The number of detectors will be increased and the wavelength coverage will be expanded. The resulting instruments will be tested at Kitt Peak National Observatory and will be the main auxiliary instruments to be used on the University of Wyoming 90-inch infrared telescope.

This is a continuation of work currently supported under NSF grant AST 76-05039 A01.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

GENERAL

11.0001, POTENTIAL IMPACTS OF SPACE UTILIZATION
P.S. CHESTON, Georgetown University, Graduate School, *3800 Reservoir Rd. N.W., Washington, District of Columbia* 20007 (NASW 3152)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

11.0002, ADMINISTRATIVE SUPPORT FOR THE LACIE SYMPOSIUM
P. SHEPARD, Texas A & M University System, Graduate School, *College Station, Texas* 77843 (NAS 9-15539)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Organization & Management, Office of University Affairs

VOLUME 16 NUMBER 24 / DECEMBER 23, 1978

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N78-33035* + National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES. SUPPLEMENT 100
Sep. 1978 94 p
(NASA-SP-7037(100)) Avail: NTIS HC E02 CSCL 01A

This bibliography lists 295 reports, articles, and other documents introduced into the NASA Scientific and Technical Information System in August 1978. Author

N78-33036# Office of Air Force History, Washington, D. C.
ENCYCLOPEDIA OF US AIR FORCE AIRCRAFT AND MISSILE SYSTEMS. VOLUME 1: POST-WORLD WAR II FIGHTERS 1945 - 1973
1978 178 p
(AD-A057002) Avail: NTIS HC A09/MF A01 CSCL 01/3

This volume contains basic information on all Air Force fighters developed between World War II and 1973, including all configurations. It is based primarily on US Air Force sources. The origin of each aircraft is noted as well as its most troublesome development, production, and operational problems. Also covered are significant modifications, most of which can be attributed to ever-changing aeronautical technology. Production totals, delivery rates, unit costs, phaseout dates, and other important milestones are provided, as well as a brief description of each version's new features. The book begins with the first postwar American jet fighter the F-80 Shooting Star. It ends with Northrop's F-5 Freedom Fighter. Complete consistency of data on each fighter was not always available, but each section describes the aircraft's basic development, production decision dates, program changes, test results, procurement methods, and the like. Technical data and operational characteristics also are provided.
Author (GRA)

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

N78-33037 California Univ., Berkeley.
AN EXPERIMENTAL STUDY OF NON-EQUILIBRIUM FREE JET EXPANSIONS OF NITROGEN Ph.D. Thesis
Donald Sumner Coe 1977 76 p
Avail: Univ. Microfilms Order No. 7812527

Translational and rotational nonequilibrium was investigated in hypersonic free jet expansions of nitrogen using the electron beam fluorescence technique. The rotational energy distribution was determined by measuring the intensity distribution in the rotational structure of the N2(+) first negative band and relating this to the initial population distribution through an appropriate model of the excitation emission process. Application of the Born approximation to the excitation process results in the dipole model. The results confirm the conclusion that the dipole model with an assumed Boltzmann energy distribution is not consistent with the measured line intensities. Dissert. Abstr.

N78-33038 California Inst. of Tech., Pasadena.
INTERFERENCE EFFECTS ON THE DRAG OF BLUFF BODIES IN TANDEM Ph.D. Thesis
Keith Koenig 1978 288 p
Avail: Univ. Microfilms Order No. 7816950

The objective was to obtain better understanding of the flow over two tandemly positioned bluff bodies in close enough proximity to strongly interact with each other. This interaction was often beneficial in that the drag of the overall system was reduced. Prototypes for this problem came from tractor-trailer and cab-van combinations and from various add-on devices designed to reduce their drag. Measurements of the velocity field in the vicinity of the forebody were made using a frequency shifted laser doppler velocimeter. These measurements showed that there was a significant difference in the shear stress along the separation surface between optimum subcritical and supercritical geometries. The drag characteristics of the axisymmetric forebody system were altered by modifying the shape of the component bodies. Modifications that change the conditions at separation from the frontbody, interfere with the cavity flow, or affect the flow on the rearbody face can product substantial changes in the forebody drag. Dissert. Abstr.

N78-33039 New Jersey Inst. of Technology, Newark.
AXISYMMETRIC AIR JET IMPINGING ON A HEMISPHERICAL CONCAVE PLATE Ph.D. Thesis
Stefan Jachna 1978 179 p
Avail: Univ. Microfilms Order No. 7815893

The jet Reynolds numbers, based on bulk nozzle velocity and nozzle exit air properties, were between 14,000 and 75,000. The impingement plate used in this work was a hemispherical surface with the radius of 94 mm. Calibrated pitot tubes and a micromanometer were used for pressure and velocity measurements. The pitot tubes were mounted on precision positioning mechanisms permitting the accurate traversing of any direction in space. The test air flow rate was measured with calibrated rotometers. Dissert. Abstr.

N78-33040 Case Western Reserve Univ., Cleveland, Ohio.
A VISCOUS-INVISCID INTERACTIVE COMPRESSOR CALCULATION Ph.D. Thesis
William Alan Johnston 1978 178 p
Avail: Univ. Microfilms Order No. 78-16469

A viscous-inviscid interactive calculation procedure for subsonic flow is developed. The procedure is applied to the flow in a single stage of an axial compressor, and calculations are carried out on a two-dimensional blade-to-blade region of constant radius which may be assumed to occupy a mid-span location, since the effects of the hub and tip regions are neglected. The interactive calculation procedure consists of an inviscid

solution which applies in core flow regions, a viscous solution in the boundary layers and wake, and an iterative scheme whereby the two can interact. Some results obtained by application of this viscous-inviscid interactive calculation procedure to the flow in a compressor blade row, with cambered blades of zero thickness, are presented. Dissert. Abstr.

N78-33041*# National Aeronautics and Space Administration, Washington, D. C.

EXPERIMENTAL ANALYSIS AND COMPUTATION OF THE ONSET AND DEVELOPMENT OF THE BOUNDARY LAYER TRANSITION

Daniel Arnal, Jean-Claude Juillen, and Roger Michel Aug. 1978 46 p refs Transl. into ENGLISH of conf. paper from ONERA, Centre d'Etudes et Recherches de Toulouse, France, 1977 19 p Presented at AGARD Symp. on Laminar-Turbulent Transition, Copenhagen, 2-4 May 1977 Original language document was announced as A77-44961 Transl. by Sci. Transl. Serv., Santa Barbara, Calif.

(Contract NASw-2791)

(NASA-TM-75325; ONERA-TP-1977-54) Avail: NTIS HC A03/MF A01 CSCL 01A

The transition of an incompressible boundary layer, with zero pressure gradient and low free-stream turbulence is studied. Mean velocity, turbulence and Reynolds shear stress profiles are presented. The development of the Tollmien-Schlichting waves is clearly shown until the turbulent spots appear. The intermittency phenomenon is studied by conditional sampling of the hotwire signal. The comparison with calculation results obtained by resolution of a set of transport equations shows a good agreement for the mean characteristics of the flow; discrepancies observed for the turbulent quantities evolution are due to the intermittency phenomenon. G.Y.

N78-33042*# National Aeronautics and Space Administration, Washington, D. C.

MEASUREMENT OF UNSTEADY PRESSURES IN ROTATING SYSTEMS

K. Kienappel Sep. 1978 15 p refs Transl. into ENGLISH from "Contribution to Steady and Unsteady Aerodynamics", Rept. DLR-FB-77-34 DFVLR, Goettingen, W. Ger., 10 Aug. 1977 p 125-136 Original language document was announced as N78-17013 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3199)

(NASA-TM-75445; DLR-FB-77-34) Avail: NTIS HC A02/MF A01 CSCL 01A

The principles of the experimental determination of unsteady periodic pressure distributions in rotating systems are reported. An indirect method is discussed, and the effects of the centrifugal force and the transmission behavior of the pressure measurement circuit were outlined. The required correction procedures are described and experimentally implemented in a test bench. Results show that the indirect method is suited to the measurement of unsteady nonharmonic pressure distributions in rotating systems. B.B.

N78-33043*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

LASER-VELOCIMETER SURVEYS OF MERGING VORTICES IN A WIND TUNNEL: COMPLETE DATA AND ANALYSIS

Victor R. Corsiglia, James D. Iversen (Iowa State Univ., Ames), and Kenneth L. Orloff Oct. 1978 48 p refs

(NASA-TM-78449; A-7262) Avail: NTIS HC A03/MF A01 CSCL 01A

The merger of two corotating vortices was studied with a laser velocimeter designed to measure the two cross-stream components of velocity. Measurements were made at several downstream distances in the vortex wake shed by two semispan wings mounted on the wind-tunnel walls. The velocity data provided wall-defined contours of crossflow velocity, stream function, and vorticity for a variety of test conditions. Downstream of the merger point, the vorticity was found to be independent of the downstream distance for radii smaller than $r/b = 0.05$. For larger radii, the vorticity depended on the distance from the wing. Upstream of the merger, a multicell vorticity pattern was found. Author

N78-33044*# United Technologies Research Center, East Hartford, Conn.

DERIVATION AND EVALUATION OF AN APPROXIMATE ANALYSIS FOR THREE-DIMENSIONAL VISCOUS SUBSONIC FLOW WITH LARGE SECONDARY VELOCITIES Final Report

O. L. Anderson, W. R. Briley, and H. McDonald Oct. 1978 84 p refs

(Contract NAS3-19752)

(NASA-CR-159430; UTRC78-106) Avail: NTIS HC A05/MF A01 CSCL 01A

An approximate analysis is presented for calculating three-dimensional, low Mach number, laminar viscous flows in curved passages with large secondary flows and corner boundary layers. The analysis is based on the decomposition of the overall velocity field into inviscid and viscous components with the overall velocity being determined from superposition. An incompressible vorticity transport equation is used to estimate inviscid secondary flow velocities to be used as corrections to the potential flow velocity field. A parabolized streamwise momentum equation coupled to an adiabatic energy equation and global continuity equation is used to obtain an approximate viscous correction to the pressure and longitudinal velocity fields. A collateral flow assumption is invoked to estimate the viscous correction to the transverse velocity fields. The approximate analysis is solved numerically using an implicit ADI solution for the viscous pressure and velocity fields. An iterative ADI procedure is used to solve for the inviscid secondary vorticity and velocity fields. This method was applied to computing the flow within a turbine vane passage with inlet flow conditions of $M = 0.1$ and $M = 0.25$, $Re = 1000$ and adiabatic walls, and for a constant radius curved rectangular duct with $R/D = 12$ and 14 and with inlet flow conditions of $M = 0.1$, $Re = 1000$, and adiabatic walls. A.R.H.

N78-33045*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AERODYNAMIC LOAD DISTRIBUTIONS AT TRANSONIC SPEEDS FOR A CLOSE-COUPLED WING-CANARD CONFIGURATION: TABULATED PRESSURE DATA

Karen E. Washburn and Blair B. Gloss Oct. 1978 231 p refs (NASA-TM-78780) Avail: NTIS HC A11/MF A01 CSCL 01A

Wind tunnel studies are reported on both the canard and wing surfaces of a model that is geometrically identical to one used in several force and moment tests to provide insight into the various aerodynamic interference effects. In addition to detailed pressures measurements, the pressures were integrated to illustrate the effects of Mach number, canard location, and canard-wing interference on various aerodynamic parameters. Transonic pressure tunnel Mach numbers ranged from 0.70 to 1.20 for data taken from 0 deg to approximately 16 deg angle-of-attack at 0 deg sideslip. G.G.

N78-33046*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

GEOMETRY REQUIREMENTS FOR UNSTEADY AERODYNAMICS IN AEROELASTIC ANALYSIS AND DESIGN

E. Carson Yates, Jr. and Luigi Morino Sep. 1978 30 p

(NASA-TM-78781) Avail: NTIS HC A03/MF A01 CSCL 01A

Aircraft geometry requirements for unsteady aerodynamic computations are discussed and differences between requirements for steady and unsteady flow are emphasized within the framework of a general potential-flow aerodynamic formulation. Its implementation in a computer program called SOUSSA (Steady, Oscillatory, and Unsteady Subsonic and Supersonic Aerodynamic is detailed. G.G.

N78-33047*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EFFECTS OF WING LEADING-EDGE DEFLECTION ON THE LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A LOW-ASPECT-RATIO HIGHLY SWEPT ARROW-WING CONFIGURATION

Paul L. Coe, Jr. and Robert P. Weston Sep. 1978 70 p refs (NASA-TM-78787) Avail: NTIS HC A04/MF A01 CSCL 01A

Wing leading-edge deflection effects on the low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration were determined. Static force tests were conducted in a V/STOL tunnel at a Reynolds number of about

2.5 x 1 million for an angle-of-attack range from -10 deg to 17 deg and an angle-of-sideslip range from -5 deg to 5 deg. Limited flow visualization studies were also conducted in order to provide a qualitative assessment of leading-edge upwash characteristics. G.G.

N78-33048*# Illinois Univ., Urbana. Dept of Aeronautical and Astronautical Engineering.
A DISTRIBUTION MODEL FOR THE AERIAL APPLICATION OF GRANULAR AGRICULTURAL PARTICLES Final Report
S. T. Fernandes and Allen I. Ormsbee Sep. 1978 75 p refs (Grant NsG-1400)
(NASA-CR-157745; AAE-TR-78-5; UILU-ENG-78-0505) Avail: NTIS HC A04/MF A01 CSCL 01A

A model is developed to predict the shape of the distribution of granular agricultural particles applied by aircraft. The particle is assumed to have a random size and shape and the model includes the effect of air resistance, distributor geometry and aircraft wake. General requirements for the maintenance of similarity of the distribution for scale model tests are derived and are addressed to the problem of a nongeneral drag law. It is shown that if the mean and variance of the particle diameter and density are scaled according to the scaling laws governing the system, the shape of the distribution will be preserved. Distributions are calculated numerically and show the effect of a random initial lateral position, particle size and drag coefficient. A listing of the computer code is included. Author

N78-33049# Naval Ship Research and Development Center, Bethesda, Md. Aviation and Surface Effects Dept.
ASSESSMENT OF LOAD ALLEVIATION DEVICES INSTALLED ON A POWER-AUGMENTED-RAM WING OVER IRREGULAR WAVES Final Report, Oct. 1976 - Aug. 1977
Earl F. McCabe, Jr. Aug. 1977 70 p
(AD-A045425; DTNSRDC-ASED-383) Avail: NTIS HC A04/MF A01 CSCL 01/1

An investigation was conducted to determine the motions and performance of a power-augmented, wing-in-ground-effect model with load alleviation devices. The effects of soft and bumpered endplates and a flexible flap were investigated for a range of velocities, thrust-to-weight ratios, and irregular wave sea states. Results showed that the flexible flap can provide a smoother, softer ride for a thrust-to-weight ratio of 0.20, but at the expense of decreased average heave and increased average drag. Results also indicated a transport efficiency degradation from 23.18 to 10.06 with increase in sea state from 0 to 5 for the model without load alleviation. The results were inconclusive for the soft and bumpered endplates. Author

N78-33050*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SUBSONIC DYNAMIC STABILITY CHARACTERISTICS OF TWO CLOSE-COUPLED CANARD-WING CONFIGURATIONS
Richard P. Boyden Oct. 1978 80 p refs
(NASA-TP-1291; L-12057) Avail: NTIS HC A05/MF A01 CSCL 01A

The pitch, yaw, and roll damping, as well as the oscillatory stability in pitch and in yaw, were measured for two canard wing configurations with wing sweeps of 44 deg and 60 deg. Tests were made at free stream Mach number of 0.3, 0.4, and 0.7 and for angles of attack from about -4 deg to 20 deg. The effects of various components such as the canard, nose strakes, wings, vertical tail, and horizontal tail were determined. The basic canard wing, vertical tail configurations generally had positive damping in pitch, yaw, and roll. The effect of the canard was generally beneficial except for its tendency to decrease the oscillatory directional stability. J.A.M.

N78-33051*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ESTIMATION OF LEADING-EDGE THRUST FOR SUPERSONIC WINGS OF ARBITRARY PLANFORM
Harry W. Carlson and Robert J. Mack Oct. 1978 51 p refs
(NASA-TP-1270; L-12283) Avail: NTIS HC A04/MF A01 CSCL 01A

A numerical method for the estimation of leading edge thrust for supersonic wings of arbitrary planform was developed and was programmed as an extension to an existing high speed digital computer method for prediction of wing pressure distributions. The accuracy of the method was assessed by comparison with linearized theory results for a series of flat delta wings. Application of the method to wings of arbitrary planform, both flat and cambered, is illustrated in several examples. J.A.M.

N78-33052# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.
A THEORETICAL AND EXPERIMENTAL STUDY OF CIRCULATION CONTROL WITH REFERENCE TO FIXED WING APPLICATIONS Ph.D. Thesis
R. V. Smith Jul. 1978 217 p refs
(RP-582) Avail: NTIS HC A10/MF A01

An experimental investigation is described of two circulation control aerofoils and the effects on them of short chord tabs designed to reduce the drag of such aerofoils at low lift coefficients. Performance improvements are demonstrated at the expense of greater system complexity. A new quasipotential flow model of circulation control applied to a circular cylinder is described. This flow model is based on the use of discrete vortices to represent the shear layer between a Coanda wall jet and an external stream. This prediction method is applicable to other Coanda and boundary layer control flows. An arbitrary form of vortex decay is used to simulate dissipative processes within the wall jet and results in improvements in performance prediction. L.S.

N78-33053*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
COMPARISON OF CONCURRENT STRAIN GAGE- AND PRESSURE TRANSDUCER-MEASURED FLIGHT LOADS ON A LIFTING REENTRY VEHICLE AND CORRELATION WITH WIND TUNNEL PREDICTIONS
Ming H. Tang, Walter J. Sefic, and Robert G. Sheldon Oct. 1978 42 p refs
(NASA-TP-1331; H-1035) Avail: NTIS HC A03/MF A01 CSCL 01A

Concurrent strain gage and pressure transducer measured flight loads on a lifting reentry vehicle are compared and correlated with wind tunnel-predicted loads. Subsonic, transonic, and supersonic aerodynamic loads are presented for the left fin and control surfaces of the X-24B lifting reentry vehicle. Typical left fin pressure distributions are shown. The effects of variations in angle of attack, angle of sideslip, and Mach number on the left fin loads and rudder hinge moments are presented in coefficient form. Also presented are the effects of variations in angle of attack and Mach number on the upper flap, lower flap, and aileron hinge-moment coefficients. The effects of variations in lower flap hinge moments due to changes in lower flap deflection and Mach number are presented in terms of coefficient slopes. Author

N78-33054*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
AERODYNAMIC DERIVATIVES FOR AN OBLIQUE WING AIRCRAFT ESTIMATED FROM FLIGHT DATA BY USING A MAXIMUM LIKELIHOOD TECHNIQUE
Richard E. Maine Oct. 1978 73 p refs
(NASA-TP-1336; H-1003) Avail: NTIS HC A04/MF A01 CSCL 01A

There are several practical problems in using current techniques with five degree of freedom equations to estimate the stability and control derivatives of oblique wing aircraft from flight data. A technique was developed to estimate these derivatives by separating the analysis of the longitudinal and lateral directional motion without neglecting cross coupling effects. Although previously applied to symmetrical aircraft, the technique was not expected to be adequate for oblique wing vehicles. The application of the technique to flight data from a remotely piloted oblique wing aircraft is described. The aircraft instrumentation and data processing were reviewed, with particular emphasis on the digital filtering of the data. A complete set of flight determined stability and control derivative estimates is presented and compared with predictions. The results demonstrated that the relatively simple approach developed was adequate to obtain

high quality estimates of the aerodynamic derivatives of such aircraft. B.B.

N78-33055# Analytic Sciences Corp., Reading, Mass.
MISSILE AERODYNAMIC PARAMETER AND STRUCTURE IDENTIFICATION FROM FLIGHT TEST DATA Final Report, Feb. - Oct. 1977
James E. Kain, Charles M. Brown, Jr., and Jang G. Lee Eglin AFB, Fla. AFATL Nov. 1977 205 p refs
(Contract F08635-77-C-0062; AF Proj. 2068)
(AD-A056343; TASC-TR-1019-2; AFATL-TR-77-129) Avail: NTIS HC A10/MF A01 CSCL 09/3

An extended Kalman filter algorithm for aerodynamic parameter identification from missile postflight data is developed and verified for realistic test conditions. The algorithm includes a general purpose six-degrees-of-freedom missile airframe model suitable for representing a variety of missile configurations. Verification studies consider low order linear aerodynamic models and higher order models with extensive nonlinear and pitch-yaw coupling effects. The sensitivity of filter performance to initial conditions, measurement data rate and accuracy, input selection, and modeling errors is investigated. A structure identification technique is used to select the most probable aerodynamic model for a given data set from a group of candidate models. In addition, actual flight test data from a complex aerodynamically controlled vehicle is processed with the filter algorithm. The resulting identified model is shown to be an improvement over the preflight model. Author (GRA)

N78-33056# Princeton Univ., N. J. Gas Dynamics Lab.
OBLIQUE SHOCK WAVE/TURBULENT BOUNDARY LAYER INTERACTIONS IN THREE DIMENSIONS AT MACH 3, PART 2 Final Report, Jun. 1975 - Jan. 1976
B. Oskam, I. E. Vas, and S. M. Bogdonoff Wright-Patterson AFB, Ohio AFFDL Mar. 1978 179 p
(Contract F33615-75-C-3126; AF Proj. 1366)
(AD-A057010; AFFDL-TR-76-48-Pt-2) Avail: NTIS HC A09/MF A01 CSCL 20/4

The second phase of a detailed experimental investigation has been carried out on the interaction between oblique shock waves and turbulent boundary layers in three dimensions. The present work extends the original region of study of the shock wave interaction area towards the streamwise corner between the shock generator and the test wall. The purpose of this report is to present the experimental data in tabulated form. The tabulations include both surface data such as heat transfer and static pressure as well as detailed flow field surveys of pitot pressure, flow angularity, static pressure and total temperature. GRA

N78-33057# Iowa Inst. of Hydraulic Research, Iowa City.
THICK AXISYMMETRIC BOUNDARY LAYER AND NEAR WAKE OF A LOW-DRAG BODY OF REVOLUTION
V. C. Patel and Y. T. Lee Dec. 1977 142 p refs
(Contract N00014-75-C-0273)
(AD-A057158; IIHR-210) Avail: NTIS HC A07/MF A01 CSCL 20/4

Detailed measurements of pressure distributions, mean velocity profiles and Reynolds stresses were made in the thick, axisymmetric boundary layer and the near wake of a low-drag body of revolution. The data are presented in graphical as well as tabular form for convenience in later analysis. These measurements shed some light on the joint influence of transverse and longitudinal surface curvatures and pressure gradients on the boundary-layer development and on the manner in which an axisymmetric boundary layer becomes a fully-developed wake. Apart from giving a complete set of data on such an important flow configuration, the measurements should provide a fairly rigorous test case for some of the recent turbulence closure models which claim a level of generality not achieved by the older phenomenological models. By inclusion of recently proposed modifications to account for the effects of the extra rates of strain on the turbulence length scale arising from longitudinal and transverse surface curvatures, it is shown that the boundary layer in the tail region of a body of revolution is dominated by the extra strain rates and that more research is needed to account for them properly even in the most recent calculation procedures. GRA

N78-33058# Dayton Univ. Research Inst., Ohio.
A COMPARATIVE STUDY OF TWO COMPUTATIONAL METHODS FOR CALCULATING UNSTEADY TRANSONIC FLOWS ABOUT OSCILLATING AIRFOILS Final Report, Apr. - Jun. 1977
Donald P. Rizzetta Nov. 1977 44 p refs
(Contract F33615-76-C-3146; AF Proj. 2307)
(AD-A056946; AFFDL-TR-77-118) Avail: NTIS HC A03/MF A01 CSCL 20/4

This report provides a direct comparison of the calculations for the flow field about an oscillating airfoil in a transonic freestream predicted by two computational methods; namely, harmonic analysis and time integration. Details of the two methods are summarized and results for NACA64A010 airfoil oscillating in pitch are considered. Comparisons of the unsteady pressure distribution and resultant lift are presented for several values of free-stream Mach number, angle of attack, and reduced frequency of oscillation. Author (GRA)

N78-33059# Ballistic Research Labs., Aberdeen Proving Ground, Md.
MEASUREMENTS IN THE TURBULENT BOUNDARY LAYER OF A YAWED, SPINNING BODY OF REVOLUTION AT MACH 3.0 WITH A LASER VELOCIMETER AND IMPACT PROBE Final Report
Lyle D. Kayser, William J. Yanta, and Walter B. Sturek May 1978 35 p refs
(DA Proj. 1L1-61102-AH-43)
(AD-A057237; AD-E430074; ARBRL-TR-02074) Avail: NTIS HC A03/MF A01 CSCL 20/4

This paper presents measurements which were made in the turbulent boundary layer on a spinning projectile shape with a flattened impact pressure probe and with a laser velocimeter. Comparison of these measurements shows that the LDV can be successfully used to obtain accurate measurements of the three-dimensional turbulent boundary layer and provides confidence that the LDV can be used in flow situations that are not practical for impact probes. GRA

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

N78-33060*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROSPECTS FOR A CIVIL/MILITARY TRANSPORT AIRCRAFT
Charles E. Jobe (USAF/ASD), Larry W. Noggle (USAF/ASD), and Allen H. Whitehead, Jr. Sep. 1978 46 p refs Presented at 1978 SAE Intern. Air Transportation Meeting, Boston, 3 May 1978
(NASA-TM-78724; Rept-791-40-13-01) Avail: NTIS HC A03/MF A01 CSCL 01C

The similarities and disparities between commercial and military payloads, design features, missions, and transport aircraft are enumerated. Two matrices of civil/military transport aircraft designs were evaluated to determine the most cost effective payloads for a projected commercial route structure and air freight market. The probability of this market developing and the prospects for alternate route structures and freight markets are evaluated along with the possible impact on the aircraft designs. Proposals to stimulate the market and increase the viability of the common aircraft concept are reviewed and the possible impact of higher cargo demand on prospects for common civil/military freighters is postulated. The implications of planned advanced technology developments on the aircraft performance and cost are also considered. Author

N78-33061*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CHARACTERISTICS OF FUTURE AIR CARGO DEMAND

AND IMPACT ON AIRCRAFT DEVELOPMENT: A REPORT ON THE CARGO/LOGISTIC AIRLIFT SYSTEMS STUDY (CLASS) PROJECT
Allen H. Whitehead, Jr. Oct. 1978 45 p refs
(NASA-TM-78774) Avail: NTIS HC A03/MF A01 CSCL 01C

Current domestic and international air cargo operations are studied and the characteristics of 1990 air cargo demand are postulated from surveys conducted at airports and with shippers, consignees, and freight forwarders as well as air, land, and ocean carriers. Simulation and route optimization programs are exercised to evaluate advanced aircraft concepts. The results show that proposed changes in the infrastructure and improved cargo loading efficiencies are as important enhancing the prospects of air cargo growth as is the advent of advanced freighter aircraft. Potential reductions in aircraft direct operating costs are estimated and related to future total revenue. Service and cost elasticities are established and utilized to estimate future potential tariff reductions that may be realized through direct and indirect operating cost reductions and economies of scale. A.R.H.

N78-33062# Transportation Systems Center, Cambridge, Mass.
AIRLINE DELAY TRENDS, 1972-1977 Final Report
Stephen Morin and Seymour M. Horowitz Jul. 1978 51 p ref
(AD-A056867; FAA-EM-78-11) Avail: NTIS HC A04/MF A01 CSCL 01/5

Estimates of block, airborne and ground delays for approximately 325 route segments connecting 20 of the most active U.S. airports, and serviced by the domestic scheduled air carriers are presented. Delay information consists of airborne and ground data displayed in both table and graph form for 20 airports for the years 1972 through 1977. A.R.H.

N78-33063# National Aviation Facilities Experimental Center, Atlantic City, N. J.
THE ANALYSIS OF NATIONAL TRANSPORTATION SAFETY BOARD SMALL MULTIENGINE FIXED-WING AIRCRAFT ACCIDENT/INCIDENT REPORTS FOR THE POTENTIAL PRESENCE OF LOW-LEVEL WIND SHEAR Final Report, Jun. - Nov. 1977
Jack J. Shrager Jun. 1978 65 p refs
(FAA Proj. 154-451-110)
(AD-A056780; FAA-NA-78-5; FAA-RD-78-55) Avail: NTIS HC A04/MF A01 CSCL 01/2

The National Transportation Safety Board aircraft accident/incident data base covering the years 1964 through 1975 was screened to select those accidents involving multiengine aircraft of less than 12,500 pounds gross weight in which the potential of low-level wind shear as a factor could not be discounted. The successive filtering techniques employed eliminated all but 27 small multi-engine fixed-wing aircraft accidents/incidents which were approximately similar to the results obtained for the large multiengine aircraft. The presence of a low-level wind shear was a distinct possibility in these 27 takeoff, approach, or landing accidents/incidents. The historical accident information indicates that orographic or local topographic induced wind shears are a more serious problem for this class aircraft than those shears related to thunderstorm and gust front activities. Author

N78-33064# National Transportation Safety Board, Washington, D. C. Bureau of Technology.
ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA, US GENERAL AVIATION, CALENDAR YEAR 1976
8 Mar. 1978 202 p
(PB-281330/1; NTSB-ARG-78-1) Avail: NTIS HC A10/MF A01 CSCL 01B

The record of aircraft accidents which occurred in U.S. general aviation operations during the calendar year 1976 is presented. It includes an analysis of accident data relating to an overview, types of accidents, accident causal factors, kinds of flying, and conclusions. A statistical compilation of accident information presented in the form of accident and rate tables, analytic tables, injury tables and cause/factor tables was reviewed. These statistical data are divided into sections pertaining to all operations, small fixed-wing aircraft, large fixed-wing aircraft, rotorcraft, gliders, and collisions between aircraft. There were 4,193 total and 695 fatal general aviation accidents that occurred during 1976. GRA

N78-33065# National Transportation Safety Board, Washington, D. C. Bureau of Technology.
ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA, US AIR CARRIER OPERATIONS, 1976
5 Jan. 1978 91 p
(PB-281329/3; NTSB-ARC-78-1) Avail: NTIS HC A05/MF A01 CSCL 01B

The record of aviation accidents in all operations of the U.S. air carriers for calendar year 1976 is presented. It includes an analysis by class of carrier and type of service in which the 1976 performances were compared with 5 year base period averages. Scheduled passenger services of the certificated route carriers for the past 5 years (1972 through 1976) were compared with the previous 5 year period (1967 through 1971) for types of accidents and phases of operation. Statistical tables, which summarize the accidents, fatalities, and accident rates; causal tables, and briefs of accidents are included. GRA

N78-33066# National Technical Information Service, Springfield, Va.
BIRD STRIKES AND AVIATION SAFETY. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jun. 1978
Guy E. Habercom, Jr. Jul. 1978 79 p Supersedes NTIS/PS-77/0606, and NTIS/PS-76/0538
(NTIS/PS-78/0694/6; NTIS/PS-77/0606; NTIS/PS-76/0538) Avail: NTIS HC $28.00/MF $28.00 CSCL 01B

Hazards to aircraft created by engine ingestion or airplane interception of birds are investigated in these Government-sponsored research reports. Bird damage assessment, structural strengthening, windshield design, and bird tracking and dispersal methods are studied. This updated bibliography contains 73 abstracts, 11 of which are new entries to the previous edition. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications*.

N78-33067 State Univ. of New York at Stony Brook.
ON THE DETECTION OF ANOMALOUS PHASE ERRORS Ph.D. Thesis
Raashid Ahmed Malik 1978 130 p
Avail: Univ. Microfilms Order No. 7813918

Algorithms for resolving phase ambiguity in a tracking system were considered. The system under study uses amplitude modulated pulses, originating in LORAN stations and retransmitted through a hard limiting transponder in a radiosonde to a ground tracking station, in order to track the radiosonde position. This tracking is achieved with the aid of a phase-locked loop (PLL) which tracks the displacement of a specified carrier zero crossing of the received signal. An anomalous noise occurrence may cause the PLL to slip a cycle. A decision rule based upon the statistical properties of the phase was devised to detect and correct the phase errors that may occur in the tracking loop. The detection algorithm exhibits a threshold effect in the sense that it functions reliably when the uplink r.m.s. signal-to-noise ratio is greater than five. Dissert. Abstr.

N78-33068# Mitre Corp., McLean, Va. Metrek Div.
PARAMETERS OF FUTURE ATC SYSTEMS RELATING TO AIRPORT CAPACITY/DELAY Final Report
Andrew L. Haines Jun. 1978 26 p refs
(Contract DOT-FA78WA-4075)
(AD-A057059; MTR-7766-Rev-1; FAA-EM-78-8A) Avail: NTIS HC A03/MF A01 CSCL 17/7

A series of site specific case studies were conducted to show how to increase airport capacity. Estimates of changes in longitudinal spacing on final approach are presented. The potential for reducing interarrival errors and runway occupancy time is

also discussed. The parametric values presented are to be used by the FAA/User Group Airport Case Study Teams in assessing the potential impact of airport air traffic control changes on delay capacity. B.B.

N78-33069# National Aviation Facilities Experimental Center, Atlantic City, N. J.
VORTEX ADVISORY SYSTEM SIMULATION OF CHICAGO O'HARE AIRPORT Final Report, Mar. - Jun. 1977
Barry E. Keeffe Jul. 1978 26 p refs
(AD-A057112; FAA-NA-78-12; FAA-RD-78-76) Avail: NTIS HC A03/MF A01 CSCL 17/7

The procedural implications of the Vortex Advisory System (VAS) on the Chicago O'Hare terminal air traffic control environment were evaluated and simulated. Cost benefits/capacity gains which may accrue using reduced VAS aircraft separation criteria on the final approach course based upon meteorological assurance of vortex dissipation were demonstrated. A real time simulation of the Chicago O'Hare International Airport airside operations was conducted between March 28 and June 24, 1977. There were 105 data runs of 1 hour and 20 minutes duration completed during this period and two favored runway configurations were identified. Three vortex clear zones were exercised: middle marker to touchdown, outer marker to touchdown and 20 nmi fix to touchdown. Test results indicate that (1) no procedural implications emerged which would deter the implementation of VAS at Chicago O'Hare Airport, and (2) arrival rate increases are sufficient to support cost/benefit analysis studies. B.B.

N78-33070# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md. Dept. of Fleet Systems.
SYSTEM DEFINITION AND INVESTIGATION OF THE ON SITE PROCESSING OF EN ROUTE SENSOR SIGNALS. ADDENDUM: INVESTIGATION INTO POSSIBLE EN ROUTE ON SITE BEACON RING AROUND DISCRIMINANTS Final Report
J. W. Thomas Feb. 1978 187 p refs Original contains color illustrations
(Contract DOT-FA75WA-3553)
(AD-A056941; FP2-E-034-Add; FAA-RD-77-12,4) Avail: NTIS HC A09/MF A01 CSCL 17/7

The characteristics existing in beacon reply data that could be used to identify false target reports generated by ring around were studied. A specific technique using run length is suggested and evaluated via statistical methods and computer simulation. A.R.H.

N78-33071# National Aviation Facilities Experimental Center, Atlantic City, N. J.
TRSB MICROWAVE LANDING SYSTEM DEMONSTRATION PROGRAM AT SHIRAZ, IRAN Final Report
Mar. 1978 45 p
(AD-A055526; FAA-NA-78-23; FAA-RD-78-23) Avail: NTIS HC A03/MF A01 CSCL 17/7

An operational demonstration concerning the Time Reference Scanning Beam (TRSB) was carried out at Shiraz International Airport serving Shiraz, Iran. Data acquisition and operational demonstration flights were flown with the FAA B-727 aircraft over the period March 3-8, 1978. During the flights, a radio telemetry theodolite was used for aircraft space position data. Flight profiles included straight-in approaches at various elevation angles. Results of the flight tests indicate that the performance of the TRSB Small Community System was within U.S. design requirements and the ICAO's reduced capability system and full capability system requirements. The feasibility of having one TRSB ground system serving two parellel runways by using offset approaches was demonstrated. B.B.

N78-33072# Federal Aviation Administration, Washington, D.C. Office of Systems Engineering Management.
THE FAA CONCEPT FOR A BEACON COLLISION AVOIDANCE SYSTEM (BCAS). VOLUME 1: EXECUTIVE SUMMARY
E. J. Koenke, L. Kleiman, E. Lucier, L. Schuchman, and W. Thedford Apr. 1978 81 p refs
(AD-A056930; FAA-EM-78-5-Vol-1) Avail: NTIS HC A05/MF A01 CSCL 01/4

A unique airborne aircraft collision avoidance system concept is presented which assures safe separation from the largest possible percentage of potential collision threats. The concept is designed to operate in all airspace as a compatible backup to the present and evolving ATC system, and to be acceptable to the pilot and the user community. The system concept capitalizes on the aviation community's large existing investment in ATCRBS transponders and on the ground based beacon surveillance system network for the basic sources of the collision avoidance information. Author

N78-33073# Federal Aviation Administration, Washington, D. C. Systems Research and Development Service.
ENGINEERING AND DEVELOPMENT PROGRAM PLAN: DISCRETE ADDRESS BEACON SYSTEM (DABS)
May 1978 42 p
(AD-A057122; FAA-ED-03-1) Avail: NTIS HC A03/MF A01 CSCL 17/7

The DABS development program consists of three major phases. Phase 1, System Design & Validation, Phase 2, Engineering Development, and Phase 3, Production Deployment. In Phase 1, a single sensor design compatible with ATCRBS, including an integral data link, was realized. This effort resulted in developing Engineering Requirements for procurement of three industry built engineering model DABS sensors for further engineering development in Phase 2, the current phase of the program. Phase 2 is system oriented, focusing on investigations of such problems as multiple sensor coordination, target hand-off, ATC interface and procedures, failure mode operation, ATARS operation, etc. Primarily the second phase of the DABS development program is addressed since Phase 3 deployment is dependent upon efforts related to the decision to implement DABS and the attendant transition planning. L.S.

N78-33074# Systems Control, Inc., Palo Alto, Calif.
LORAN-C, OMEGA, AND DIFFERENTIAL OMEGA APPLIED TO THE CIVIL AIR NAVIGATION REQUIREMENT OF CONUS, ALASKA, AND OFFSHORE. VOLUME 1: EXECUTIVE SUMMARY Final Report, Jul. 1976 - Dec. 1977
W. Heine, F. G. Karkalik, and E. D. McConkey Apr. 1978 44 p 3 Vol.
(Contract DOT-FA75WA-3662)
(AD-A056740; FAA-RD-78-30-1-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 17/7

The civil air navigation requirements for CONUS, CONUS Offshore, Alaska, and Alaska Offshore were validated. A requirements matrix was developed to provide a common basis for defining the requirements across all the geographic areas considered. The capabilities of Loran-C, Omega, Differential Omega, and VLF communications toward meeting the requirements were assessed in an executive summary. B.B.

N78-33075# Systems Control, Inc., Palo Alto, Calif.
LORAN-C, OMEGA, AND DIFFERENTIAL OMEGA APPLIED TO THE CIVIL AIR NAVIGATION REQUIREMENT OF CONUS, ALASKA, AND OFFSHORE. VOLUME 2: ANALYSIS Final Report, Jul. 1976 - Dec. 1977
W. Heine, F. G. Karkalik, and E. D. McConkey Apr. 1978 222 p refs 3 Vol.
(Contract DOT-FA75WA-3662)
(AD-A056741; FAA-RD-78-30-2-Vol-2) Avail: NTIS HC A10/MF A01 CSCL 17/7

A detailed analysis supporting information contained in the executive summary is presented. B.B.

N78-33076# Systems Control, Inc., Palo Alto, Calif.
LORAN-C, OMEGA, AND DIFFERENTIAL OMEGA APPLIED TO THE CIVIL AIR NAVIGATION REQUIREMENTS OF CONUS, ALASKA, AND OFFSHORE. VOLUME 3: SUPPORTING APPENDICES Final Report, Jul. 1976 - Dec. 1977
W. Heine, F. G. Karkalik, and E. D. McConkey Apr. 1978 111 p refs 3 Vol.
(Contract DOT-FA75WA-3662)
(AD-A056742; FAA-RD-78-30-3-Vol-3) Avail: NTIS HC A06/MF A01 CSCL 17/7

Appendices are presented containing data concerning Loran-C

accuracy and coverage characteristics. Results of the Omega accuracy analysis in the CONUS, Alaska and offshore regions are summarized. Trade-off analysis for the Differential Omega configuration is also included. B.B.

N78-33077# Megatek Corp., San Diego, Calif.
OMEGA NORWAY ANTENNA SYSTEM CHARACTERISTICS: MODIFICATION AND VALIDATION TESTS. VOLUME 1: REPORT PROPER Final Report
A. N. Smith and J. C. Hanselman 8 May 1978 71 p refs 4 Vol.
(Contract N00123-75-C-0328)
(AD-A056702; NOSC-TR-246-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 17/7

Electronic measurements were performed on the Bratland Omega Antenna System. The antenna height had been significantly lowered in 1975, therefore tests were conducted on antenna performance in three configurations, so that a curve of performance for each frequency of operation is now available as a function of antenna span height. A determination of geometry by means of an optical survey was carried out. Reference data for future comparison, in the event the antenna spans are raised, are thus available. The electrical height of the antenna is 205 metres for 10.2 kHz when the span is in the so-called 1975 or intermediate elevation in which spans 1 and 3 are respectively paid out 14 and 10 1/2 turns from the high or 1973 position. The effective height varies directly as the mean span height, so that the percent increases are the same for electrical and geometrical height. For the 1973 position the effective height is 229 metres. There is a small frequency variation which is very nearly proportional to the fifth root of the frequency ratio. The antenna system efficiency in the 1975 configuration is 5.9% and in the 1973 configuration is 7.3%; therefore, with 150 kW antenna system input power the station will be able to radiate 10 kW when the spans are raised. For this mode of operation the spans are operating at about 70% of their design voltage limit or less; full 10 kW radiated can be obtained by raising the spans back to the full 1973 height. GRA

N78-33078# Megatek Corp., San Diego, Calif.
OMEGA NORWAY ANTENNA SYSTEM CHARACTERISTICS: MODIFICATION AND VALIDATION TESTS. VOLUME 2: DATA SHEETS Final Report
A. N. Smith and J. C. Hanselman 8 May 1978 145 p 4 Vol.
(Contract N00123-75-C-0328)
(AD-A056629; NOSC-TR-246-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 17/7

Data recorded during the performance of modification and validation tests on the OMEGA Norway antenna system are presented on data sheets designed to facilitate analysis and computation of desired operating parameters. Parameters covered include capacitance, radio field intensity site location and measurements, and antenna switch resistance. J.M.S.

N78-33079# Megatek Corp., San Diego, Calif.
OMEGA NORWAY ANTENNA SYSTEM CHARACTERISTICS: MODIFICATION AND VALIDATION TESTS. VOLUME 3: TEST PLAN FOR BASE IMPEDANCE Final Report
A. N. Smith and J. C. Hanselman 8 May 1978 31 p 4 Vol.
(Contract N00123-75-C-0328)
(AD-A056685; NOSC-TR-246-Vol-3) Avail: NTIS HC A03/MF A01 CSCL 17/7

Instrumentation and procedures for measuring the apparent capacitance and the self-resonant frequency of the antenna system are described along with calculation of the static capacitance and inductance of the antenna. Measurement of the antenna system resistance is discussed. J.M.S.

N78-33080# Megatek Corp., San Diego, Calif.
OMEGA NORWAY ANTENNA SYSTEM CHARACTERISTICS, MODIFICATION AND VALIDATION TESTS. VOLUME 4: TEST PLAN FOR FIELD INTENSITY MEASUREMENTS Final Report
A. N. Smith and J. C. Hanselman 8 May 1978 17 p 4 Vol.
(Contract N00123-75-C-0328)
(AD-A056631; NOSC-TR-246-Vol-4) Avail: NTIS HC A02/MF A01 CSCL 17/7

Instrumentation and procedures for making field intensity measurements of the antenna system are described. Determination of the radiation resistance is obtained from the radiated field, frequency, and input current when the antenna is used as a radiator. Formulas are given. J.M.S.

N78-33081# Honeywell, Inc., Minneapolis, Minn. Systems and Research Center.
INDEPENDENT STABILITY AND CONTROL ANALYSIS OF NAVIGATION DEVELOPMENT SATELLITES FOR THE GLOBAL POSITIONING SYSTEM. VOLUME 1: TECHNICAL REPORT Final Report, 3 Feb. 1975 - 9 Sep. 1977
R. E. Pope, M. D. Ward, M. F. Barrett, J. G. Rupert, and S. P. Kau Jan. 1978 355 p ref 2 Vol.
(Contract F04701-75-C-0135)
(AD-A056811; HONEYWELL-78SRC10-Vol-1; SAMSO-TR-78-74-Vol-1) Avail: NTIS HC A16/MF A01 CSCL 17/7

This report documents the results of an independent stability and control analysis of the control systems and procedures of the navigation development satellite (NDS) for the global positioning system (GPS). The analysis consisted of detailed analytical investigation substantiated with sophisticated satellite system modeling and simulation of the following GPS mission events: Spin phase, Despin, Earth acquisition, Panel deployment, Sun acquisition, and On-orbit operations. The results of the analysis indicated satisfactory performance in all mission phases analyzed. A redesign of the jet control system was recommended to facilitate earth acquisition operations. Author (GRA)

N78-33082# Honeywell, Inc., Minneapolis, Minn. Systems and Research Center.
INDEPENDENT STABILITY AND CONTROL ANALYSIS OF NAVIGATION DEVELOPMENT SATELLITES FOR THE GLOBAL POSITIONING SYSTEM. VOLUME 2: APPENDIXES Final Report, 3 Feb. 1975 - 9 Sep. 1977
R. E. Pope, M. D. Ward, M. F. Barrett, J. G. Rupert, and S. P. Kau Jan. 1978 194 p refs 2 Vol.
(Contract F04701-75-C-0135)
(AD-A056812; HONEYWELL-78SRC10-Vol-2; SAMSO-TR-78-74-Vol-2) Avail: NTIS HC A09/MF A01 CSCL 17/7

Contents: (1) Data Baseline Definition, 15 July 1977, (2) One-Body Model Equations, (3) Three-Body Dynamic Model, (4) Nutation Damper Model, (5) Model for GPS Digital Spin Sun Sensor (SSS), (6) Reaction Jet Model for GPS Independent Analysis, (7) GPS Deployment Model, (8) Solar Pressure Torque and Force Model, (9) Solar Array Flexibility Model, (10) Combined Earth Sensor Model, and (11) Wheel-Momentum Coupling. GRA

N78-33083# Sandia Labs., Albuquerque, N. Mex.
CONTINUOUS KALMAN UPDATING OF AN INERTIAL NAVIGATION SYSTEM USING TERRAIN MEASUREMENTS
Ronald D. Andreas, Larry D. Hostetler, and Richard C. Beckmann 1978 8 p refs Presented at the Natl. Aerospace and Electron. Conf., Dayton, Ohio, 16 May 1978
(Contract EY-76-C-04-0789)
(SAND-78-0421C; Conf-780525-1) Avail: NTIS HC A02/MF A01

A system called SITAN (Sandia Inertial Terrain-Aided Navigation) is described that applies Kalman filtering techniques to continuously update an inertial navigation system from an initial point to a target. The continuous updating is accomplished by using an extended Kalman filter that utilizes as its measurement the difference between a predicted ground clearance, based on stored topographic data, and a radar altimeter derived ground clearance. An adaptive lineralization technique is used to minimize the effect of terrain measurement nonlinearities. Theoretical system accuracy curves for position and velocity are presented and the results of flight test experiments directed toward a specific application are described. ERA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N78-33084 Case Western Reserve Univ., Cleveland, Ohio.
CONVECTION INDUCED BY G-JITTER IN RECTANGULAR ENCLOSURES ABOARD SPACECRAFT Ph.D. Thesis
Arbind Prasad 1978 162 p
Avail: Univ. Microfilms Order No. 7816483

An analytical two dimensional model of a rectangular enclosure, completely filled with a viscous, Newtonian fluid, in a reduced gravity environment was chosen and the effect of various kinds of g-jitter was investigated mathematically for the conditions when the imposed temperature gradient is perpendicular to the direction of g-jitter. Differential equations describing the fluid motion are simplified by using a perturbation technique and important dimensionless parameters governing the flow field are obtained. Various kinds of g-jitter are broadly classified under two categories. The effect of each kind of g-jitter on the convective flow field is discussed. The different activities in a spacecraft which produce g-jitter are cited and an order of magnitude analysis for g-jitter was also made. The activities which have a pronounced effect on heat transfer are indicated and the method for avoiding it is also shown. Dissert. Abstr.

N78-33085*# Kaman Aerospace Corp., Bloomfield, Conn.
THEORETICAL STUDY OF MULTICYCLIC CONTROL OF A CONTROLLABLE TWIST ROTOR
A. Z. Lemnios and Frank K. Dunn Apr. 1976 68 p refs
(Contract NAS2-7738)
(NASA-CR-151959; R-1393) Avail: NTIS HC A04/MF A01 CSCL 01C

Analytical studies were performed to ascertain the feasibility of reducing helicopter rotor induced 4/rev vibratory forces by means of multicyclic flap control input on a dual control, four bladed rotor system. The dual control consisted of a primary inboard pitch horn blade control and a secondary outboard flap control. Flap control was put in at frequencies greater than the rotor rotational speed. Author

N78-33086*# Lockheed-California Co., Burbank.
THE COMMON CASE STUDY: LOCKHEED DESIGN OF A SUPERSONIC CRUISE VEHICLE Final Report, Jan. - Aug. 1978
J. S. Clauss, Jr., A. P. Hays, and J. R. Wilson 11 Aug. 1978 51 p refs
(Contract NAS1-14625)
(NASA-CR-158935; LR-28705) Avail: NTIS HC A04/MF A01 CSCL 01C

The objective was to compare the characteristics of SSTs designed for the same mission by Lockheed, McDonnell Douglas, British Aerospace (U.K.), Aerospatiale (France), and the USSR. This comparison was to be used to calibrate parametric design studies of the tradeoff between SST direct operating cost (DOC) and noise levels at the FAR 36 certification points. The guidelines for this common case study were to design an aircraft with the following mission: payload 23 247 kg (51 250 lbm), range - 7000 km (3780 n. mi.), and cruise Mach number - 2.2. Field length was constrained to 3505 m (11 500 ft). Other airfield constraints and fuel reserves were also specified, but no noise constraints were applied. J.A.M.

N78-33087*# Vought Corp., Hampton, Va. Technical Center.
PRELIMINARY DESIGN CHARACTERISTICS OF A SUBSONIC BUSINESS JET CONCEPT EMPLOYING LAMINAR FLOW CONTROL
R. V. Turriziani, W. A. Lovell, J. E. Price, C. B. Quartero, and G. F. Washburn Sep. 1978 48 p refs
(Contract NAS1-13500)
(NASA-CR-158958) Avail: NTIS HC A03/MF A01 CSCL 01C

Aircraft configurations were developed with laminar flow control (LFC) and without LFC. The LFC configuration had approximately eleven percent less parasite drag and a seven percent increase in the maximum lift-to drag ratio. Although these aerodynamic advantages were partially offset by the additional weight of the LFC system, the LFC aircraft burned from six to eight percent less fuel for comparable missions. For the trans-atlantic design mission with the gross weight fixed, the LFC configuration would carry a greater payload for ten percent fuel per passenger mile. G.G.

N78-33088# Boeing Commercial Airplane Co., Seattle, Wash.
WING PLANFORM GEOMETRY EFFECTS ON LARGE SUBSONIC MILITARY TRANSPORT AIRPLANES Final Technical Report, Mar. 1976 - Feb. 1977
Robert M. Klufan and John D. Vachal Feb. 1978 66 p refs
(Contract F33615-76-C-3035)
(AD-A056124; D6-46317; AFFDL-TR-78-16) Avail: NTIS HC A04/MF A01 CSCL 01/3

A Preliminary Design Study of large turbulent flow military transport aircraft has been made. The study airplanes were designed to carry a heavy payload (350,000 lb) for a long range (10,000 nmi). The study tasks included: Wing geometry/cruise speed optimization of a large cantilever wing military transport airplane; Preliminary design and performance evaluation of a strut-braced wing transport airplane; and Structural analyses of large-span cantilever and strut-braced wings of graphite/epoxy sandwich construction (1985 technology). The best cantilever wing planform for minimum takeoff gross weight, and minimum fuel requirements, as determined using statistical weight evaluations, has a high aspect ratio, low sweep, low thickness/chord ratio, and a cruise Mach number of 0.76. A near optimum wing planform with greater speed capability (M = 0.78) has an aspect ratio = 12, quarter chord sweep = 20 deg, and thickness/chord ratio of 0.14/0.08 (inboard/outboard). GRA

N78-33089# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MECHANIZATION OF BLENDED A SUB N MODE FOR CCV YF-16 M.S. Thesis
Kenneth R. Race Mar. 1978 136 p refs
(AD-A056553; AFIT/GAE/AA/78M-16) Avail: NTIS HC A07/MF A01 CSCL 01/3

A root locus analysis and computer simulation are used to determine the feasibility of one proposed method of mechanizing the blending of the normal acceleration mode with the basic aircraft response for the CCV YF-16. The root locus analysis predicts the stability and speed of response of the mechanized aircraft. The computer simulation confirms these results. Comparison is made of the responses of the basic, present CCV, and proposed mechanized YF-16. Author (GRA)

N78-33090# Army Materiel Systems Analysis Activity, Aberdeen Proving Ground, Md.
RELIABILITY, AVAILABILITY AND MAINTAINABILITY ANALYSIS OF THE AQUILA REMOTELY PILOTED VEHICLE SYSTEM
Douglas N. Warrington Jul. 1978 66 p refs
(AD-A056942; AMSAA-IN-R-69) Avail: NTIS HC A04/MF A01 CSCL 01/3

This report presents an analysis of RAM data obtained during tests conducted at Fort Huachuca, AZ, from July 1977 to November 1977 on the AQUILA Remotely Piloted Vehicle-System Technology Demonstrator. These data were used to estimate the RAM characteristics of the AQUILA RPV system as exhibited during the tests, to provide a RAM data base on an RPV system, to provide a starting point for reliability growth analysis, and to highlight the major failure modes and special RAM problem areas associated with the AQUILA RPV system. Author (GRA)

N78-33091# Army Troop Support and Aviation Materiel Readiness Command, St. Louis, Mo.
BELL UH-1H RAM/LOG REPORT Final Report, 21 May 1975 - 19 Jun. 1976
Apr. 1978 380 p
(AD-A057231; TSARCOM-TR-78-4) Avail: NTIS HC A17/MF A01 CSCL 01/3

This RAM/LOG report was generated to establish a comprehensive base line for the UH-1H helicopter and to debug the new RAM/LOG data collection system. The test used 7 aircraft for a total of 1339.4 flight hours over a period of

463 days. Some of the test results are as follows: System MTBR (3.62 hrs) Mission Reliability (.99), Achieved Availability (.95) and total number of parts replaced (455 items). Author (GRA)

N78-33092# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
B-1 EMUX AUTOMATED LOGIC DIAGRAMMER DEMONSTRATION PROGRAM Final Report, Jul. 1975 - Sep. 1977
Ronald B. Berger May 1978 53 p refs
(AD-A056964; ASD-TR-78-17) Avail: NTIS HC A04/MF A01 CSCL 01/3

The B-1 aircraft Electrical Multiplex System (EMUX) is a programmable computer network which provides control of aircraft electrical loads, provides automatic electrical load management, and provides digital data transfer. Boolean (or logic) equations are used to program the system. A computer program was developed in-house to demonstrate the feasibility of automatically creating logic diagrams of the Boolean equations directly from the same EMUX computer files used to program the system. Program BOLD B-1 One (Logic Diagrammer), the result of this study, is documented in this report. Author (GRA)

N78-33093# Cortland Line Co., N. Y.
DESIGN AND DEVELOPMENT OF HELICOPTER EXTERNAL CARGO SLING LEGS MADE WITH KEVLAR Final Report
E. Scala Jun. 1978 27 p refs
(Contract DAAJ02-76-C-0025; DA Proj. 1F2-62209-AH76-06)
(AD-A056951; USARTL-TR-78-20) Avail: NTIS HC A03/MF A01 CSCL 01/3

Quantitative equations and graphs for torque balanced Kevlar rope constructions have been applied to the preliminary design of sling legs for heavy lift helicopters. Fifty one 14 foot sling legs were made and tested to determine minimum break strengths for the 10,000 lb (10K), 25,000 lb (25K), and 40,000 lb (40K) load capacity assemblies. Three 10K assemblies using torque balanced Kevlar rope with eye-spliced terminations over No. 2 SLIP-THRU thimbles were delivered to USAAMRDL (AVSCOM) for field testing. Three 25K and four 40K assemblies made by an alternative torque balanced Kevlar grommet design were also delivered for field testing. The four sling legs on each of these 10K assemblies were made using torque balanced Kevlar rope with eye-spliced terminations over No. 2 SLIP-THRU thimbles. The three 25 K and four 40 K assemblies delivered for field testing were made by an alternative torque balanced Kevlar grommet design No. 3 and 4 size thimbles. Author (GRA)

N78-33094# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
AIRCRAFT DEFOGGING AND DEFROSTING (TRANSPARENT AREA) Final Report
31 May 1978 15 p Supersedes MTP-7-3-522
(AD-A056976; TOP-7-3-522) Avail: NTIS HC A02/MF A01 CSCL 01/3

Provides procedures for testing and evaluating aircraft defogging and defrosting equipment. The test item may be an integral part of the aircraft environmental control system or a separate system designed to operate independently or in conjunction with the aircraft environmental control system. The procedure is to determine if the test item can prevent or eliminate fogging or frosting of the interior and exterior surfaces of aircraft transparent areas in all aircraft operational modes. Author (GRA)

N78-33095# Douglas Aircraft Co., Inc., Long Beach, Calif.
PRIMARY ADHESIVELY BONDED STRUCTURE TECHNOLOGY (PABST). PHASE 1: DETAIL DESIGN Final Report, Sep. 1976 - Dec. 1977
Wright-Patterson AFB, Ohio AFFDL Dec. 1977 305 p refs
(Contract F33615-75-C-3016; AF Proj. 486U)
(AD-A056857; AFFDL-TR-77-135) Avail: NTIS HC A14/MF A01 CSCL 01/3

This report covers the design, analysis, and trade studies conducted during Phase 2, Detail Design of the Primary Adhesively Bonded Structure Technology (PABST) Program. During this Phase, drawings were made and released to Manufacturing for the construction of a 42 foot long test component simulating the forward fuselage of the C-15 airplane. The design concept, selected at the completion of Phase 1b-Preliminary Design consisted of wide spaced/close spaced internal longerons in the upper fuselage and external longerons in the lower (bilge area) fuselage. External loads were developed for both fatigue and ultimate loading conditions in conformance with the military specifications. The external shears and bending moments were matched to the Full Scale Demonstration Component test curves, adjusted for the actual test fixture loading points. Internal loads were generated and static, damage tolerance and fatigue analyses were performed on the Full Scale Demonstration Component. A spectra was developed based on a statistical analysis of information accumulated from Air Force operations and used for the fatigue and damage tolerance analyses. Author (GRA)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N78-33096*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ATS-6 FLIGHT ACCELEROMETERS
R. Mattson, George Honeycutt, and Fred Lindner 1978 11 p
(NASA-TM-79847) Avail: NTIS HC A02/MF A01 CSCL 01D

Five accelerometers mounted near the adapter base of the Titan 3-C launch vehicle and three on the hub of the ATS-F spacecraft provided (1) data for verifying basic spacecraft mode shapes and frequencies during powered flight while attached to the launch vehicle; (2) failure mode detection and diagnostic information on in-flight anomalies; and (3) data to be used in the design of future spacecraft to be flown on the Titan 3-C. Because data from the instruments mounted on the spacecraft hub passed through an in-flight disconnect at the separation plane between the transtage and ATS-F, the moment this connector was broken, the signal to the telemetry system showed a step function change. By monitoring these telemetry traces on the ground at appropriate times during flight sequences, a positive indication of spacecraft separation was obtained. Flight data showing dynamic response at spacecraft launch vehicle interface and at the top of ATS spacecraft during significant launch events are presented in tables. A.R.H.

N78-33097# Battelle Columbus Labs., Ohio.
SYSTEM AVIONICS VALUE ESTIMATION (SAVE): AN AID FOR AVIONICS LOGISTICS-AND-SUPPORT-COST ANALYSES Final Report, 15 Jul. 1976 - 30 Jun. 1977
Thomas R. Cork and Joan F. Mulcahy Sep. 1977 284 p refs
(Contract F33615-76-C-1299)
(AD-A056348; AFAL-TR-77-179) Avail: NTIS HC A13/MF A01 CSCL 01/3

This report documents a research effort to develop an interactive graphics computer system which will allow government cost analysts to exercise five existing logistics and support cost models in an integrated, consistent, and efficient manner. GRA

N78-33098# Naval Postgraduate School, Monterey, Calif.
A STUDY OF ALTERNATIVES FOR VSTOL COMPUTER SYSTEMS Final Report, Feb. - Dec. 1977
Uno R. Kodres, James D. Buttinger, Richard W. Hamming, and Carl R. Jones Apr. 1978 252 p refs
(AD-A056105; NPS52-78-001) Avail: NTIS HC A12/MF A01 CSCL 01/3

This study assesses the impact of Large Scale Integration on future airborne digital systems, with a focus on the VSTOL systems. The study addresses the design, implementation, testing, servicing and the associated life cycle costs of airborne digital computer systems, both the hardware and the programs necessary for successful operation of the system. The scope of the study is limited to the computer system, not the sensors, keyboards, displays and other peripheral equipment. The study provides: information for decision making on the future course of action, a design philosophy, a process analysis methodology, and a life cycle cost analysis method. Author (GRA)

N78-33099# Naval Aerospace Medical Research Lab., Pensacola, Fla.

HUMAN FACTORS ENGINEERING FOR HEAD-UP DISPLAYS: A REVIEW OF MILITARY SPECIFICATIONS AND RECOMMENDATIONS FOR RESEARCH Interim Report
Dennis E. Egan and James E. Goodson Apr. 1978 52 p refs
(AD-A056944; NAMRL-Monograph-23) Avail: NTIS HC A04/MF A01 CSCL 01/4

This report is a review of Human Factors literature and military specifications concerning Head-Up Displays (HUDs). The objective is to identify important categories of Human Factors research concerning virtual-image displays. These research categories are questions that must be answered before specifications can be written for the optimal design of HUDs. The review encompassed an exhaustive list of references available through the Defense Documentation Center (DDC) as well as other pertinent sources not given in the DDC listing. Each requirement in the General Specification for Head-Up Displays, MIL-D-81641 (AS), was compared with the available data. The data base for requirements and the importance of further research concerning each requirement were qualitatively rated. Categories of necessary research were established. Human Factors knowledge has not kept pace with the proliferating uses of HUDs and the expansion of HUD technology. Consequently, the majority of existing Human Factors specifications for HUDs are based on expert opinion rather than emperical data. Several categories of research are required to provide an adequate data base for future specifications, and to understand how specific issues in the design of HUDs affect performance. Author (GRA)

N78-33100# IBM Federal Systems Div., Owego, N. Y.
STANDARD MODULAR POWER SUPPLIES FOR AVIONICS Final Report, 15 Apr. 1976 - 15 Feb. 1978
Craig D. Smith and James F. Malia May 1978 106 p
(Contract F33615-76-C-1240)
(AD-A057159; AFAL-TR-78-59) Avail: NTIS HC A06/MF A01 CSCL 10/2

The objective of this effort is to reduce avionic system life cycle cost by developing a set of standard power supply modules for application in Air Force avionics. The results of this effort to develop such a set of power supply modules are discussed. Included in this report are: an examination of avionic power requirements to determine the extent of commonality in terms of output voltage and power level; an analysis and evaluation of alternative power supply designs and selection of the optimum approach to meet the defined requirements; and extension of these studies to include more equipment items of recent design and definition of other module types that offer cost advantages to the module set proposed; and a prototype design, development and construction of a representative sample of the recommended module set and a life cycle cost comparison of the standard vs. custom approach. GRA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N78-33101* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
REDUNDANT DISC Patent
William N. Barack (GE, Cincinnati), Paul A. Domas (GE, Cincinnati), and Stephen W. Beekman, inventors (to NASA) (GE, Cincinnati) Issued 27 Jun. 1978 7 p Filed 22 Mar. 1976 Sponsored by NASA
(NASA-Case-LEW-12496-1; US-Patent-4,097,194; US-Patent-Appl-SN-668971; US-Patent-Class-416-244A; US-Patent-Class-416-214A; US-Patent-Class-74-572; US-Patent-Class-29-463) Avail: US Patent Office CSCL 21E

A rotatable disc is described that consists of parallel plates tightly joined together for rotation about a hub. Each plate is provided with several angularly projecting spaced lands. The lands of each plate are interposed in alternating relationship between the lands of the next adjacent plate. In this manner, circumferential displacement of adjacent sectors in any one plate is prevented in the event that a crack develops. Each plate is redundantly sized so that, in event of structural failure of one plate, the remaining plates support a proportionate share of the load of the failed plate. The plates are prevented from separating laterally through the inclusion of generally radially extending splines which are inserted to interlock cooperating, circumferentially adjacent lands. Official Gazette of the U.S. Patent Office

N78-33102*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RESULTS AND STATUS OF THE NASA AIRCRAFT ENGINE EMISSION REDUCTION TECHNOLOGY PROGRAMS
R. E. Jones, L. A. Diehl, D. A. Petrash, and J. Grobman Oct. 1978 53 p refs
(NASA-TM-79009; E-9793) Avail: NTIS HC A04/MF A01 CSCL 21E

The results of an aircraft engine emission reduction study are reviewed in detail. The capability of combustor concepts to produce significantly lower levels of exhaust emissions than present production combustors was evaluated. The development status of each combustor concept is discussed relative to its potential for implementation in aircraft engines. Also, the ability of these combustor concepts to achieve proposed NME and NCE EPA standards is discussed. B.B.

N78-33103*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
BLADE ROW DYNAMIC DIGITAL COMPRESSION PROGRAM. VOLUME 2: J85 CIRCUMFERENTIAL DISTORTION REDISTRIBUTION MODEL, EFFECT OF STATOR CHARACTERISTICS, AND STAGE CHARACTERISTICS SENSITIVITY STUDY
W. A. Tesch and W. G. Steenken Jul. 1978 76 p refs
(Contract NAS3-18526)
(NASA-CR-134953; R76AEG484-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 21E

The results of dynamic digital blade row compressor model studies of a J85-13 engine are reported. The initial portion of the study was concerned with the calculation of the circumferential redistribution effects in the blade-free volumes forward and aft of the compression component. Although blade-free redistribution effects were estimated, no significant improvement over the parallel-compressor type solution in the prediction of total-pressure inlet distortion stability limit was obtained for the J85-13 engine. Further analysis was directed to identifying the rotor dynamic response to spatial circumferential distortions. Inclusion of the rotor dynamic response led to a considerable gain in the ability of the model to match the test data. The impact of variable stator loss on the prediction of the stability limit was evaluated. An assessment of measurement error on the derivation of the stage characteristics and predicted stability limit of the compressor was also performed. Author

N78-33104*# AiResearch Mfg. Co., Phoenix, Ariz.
POLLUTION REDUCTION TECHNOLOGY PROGRAM FOR SMALL JET AIRCRAFT ENGINES, PHASE 2 Final Report
T. W. Bruce, F. G. Davis, T. E. Kuhn, and H. C. Mongia Sep. 1978 187 p refs
(Contract NAS3-20044)
(NASA-CR-159415; AiResearch-21-2817) Avail: NTIS HC A09/MF A01 CSCL 21A

A series of iterative combustor pressure rig tests were conducted on two combustor concepts applied to the AiResearch TFE731-2 turbofan engine combustion system for the purpose of optimizing combustor performance and operating characteristics consistant with low emissions. The two concepts were an axial air-assisted airblast fuel injection configuration with variable-geometry air swirlers and a staged premix/prevaporization configuration. The iterative rig testing and modification sequence on both concepts was intended to provide operational compatibility with the engine and determine one concept for further evaluation in a TFE731-2 engine. Author

N78-33105# Environmental Sciences Research Lab., Research Triangle Park, N.C. Emissions Measurement and Characterization Div.

NON-EXTRACTIVE ELECTRO-OPTICAL MEASUREMENT OF JET-ENGINE EMISSIONS Final Report, May - Dec. 1977
William F. Herget Jan. 1978 27 p refs
(Contract DOT-FA77WAI-744)
(AD-A056783; FAA-RD-78-10) Avail: NTIS HC A03/MF A01 CSCL 21/2

A series of measurements of jet engine emissions were conducted in an airport environment using several infrared gas filter correlation (GFC) instruments and a high resolution Fourier transform infrared (FTIR) spectrometer system. The GFC instruments were shown to be suitable for measuring CO concentrations in the general airport environment and across the exhaust of a stationary jet. Attempts to determine jet plume rise velocity from the GFC data were unsuccessful. The FTIR system was used to make both absorption and emission measurements on single jets and to make long-path absorption measurements in the general airport environment. Species observed in the single jet absorption measurements were CO (28 ppm), formaldehyde (1 ppm), ethylene (3.2 ppm), and cumulative hydrocarbons (8.6 ppm hexane equivalent). The instrumentation and the measurement programs are described and recommendations for additional work are given. B.B.

N78-33106# IIT Research Inst., Chicago, Ill.
TURBINE ENGINE PARTICULATE EMISSION CHARACTERIZATION, PHASE 2 Final Report
D. L. Fenton Oct. 1977 103 p refs
(Contract DOT-FA75WA-3722)
(AD-A057370; C6352-17; FAA-RD-77-165) Avail: NTIS HC A06/MF A01 CSCL 21/5

A particulate sampling system was designed and fabricated for the collection of exhaust particles emitted by aircraft turbine engines. The samples obtained by the sampling system were suitable for the determination of total mass emission rate and characterization of the exhaust particles. Two separate samples were necessary - a bulk sample for mass emission rate and a light deposit of particles for individual characterization. Operational adjustments and performance evaluations were made utilizing a TF-30 mixed-flow turbojet engine. The reliability of the data was established through repeated tests and the collaboration among the different techniques used to characterize the particles. Author

N78-33107*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF A TRANSONIC FAN STAGE DESIGNED FOR A LOW MERIDIONAL VELOCITY RATIO
Royce D. Moore, George W. Lewis, Jr., and Walter M. Osborn Nov. 1978 83 p refs
(NASA-TP-1298; E-8994) Avail: NTIS HC A05/MF A01 CSCL 21E

The aerodynamic performance and design parameters of a transonic fan stage are presented. The fan stage was designed for a meridional velocity ratio of 0.8 across the tip of the stage, a pressure ratio of 1.57, a flow of 29.5 kilograms per second, and a tip speed of 426 meters per second. Radial surveys were obtained over the stable operating range from 50 to 100 percent of design speed. The measured, peak efficiency (0.81) of the stage occurred at a pressure ratio of 1.58 and a flow of 28.7 kilograms per second. L.S.

N78-33108*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN AND OVERALL PERFORMANCE OF FOUR HIGHLY LOADED, HIGH SPEED INLET STAGES FOR AN ADVANCED HIGH-PRESSURE-RATIO CORE COMPRESSOR
Lonnie Reid and Royce D. Moore Oct. 1978 122 p refs
(NASA-TP-1337; E-9302) Avail: NTIS HC A06/MF A01 CSCL 21E

The detailed design and overall performances of four inlet stages for an advanced core compressor are presented. These four stages represent two levels of design total pressure ratio (1.82 and 2.05), two levels of rotor aspect ratio (1.19 and 1.63), and two levels of stator aspect ratio (1.26 and 1.78). The individual stages were tested over the stable operating flow range at 70, 90, and 100 percent of design speeds. The performances of the low aspect ratio configurations were substantially better than those of the high aspect ratio configurations. The two low aspect ratio configurations achieved peak efficiencies of 0.876 and 0.872 and corresponding stage efficiencies of 0.845 and 0.840. The high aspect ratio configurations achieved peak ratio efficiencies of 0.851 and 0.849 and corresponding stage efficiencies of 0.821 and 0.831. Author

N78-33109*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN AND PERFORMANCE OF A 427-METER-PER-SECOND-TIP-SPEED TWO-STAGE FAN HAVING A 2.40 PRESSURE RATIO
Walter S. Cunnan, William Stevans, and Donald C. Urasek Oct. 1978 96 p refs
(NASA-TP-1314; E-9005) Avail: NTIS HC A05/MF A01 CSCL 21E

The aerodynamic design and the overall and blade-element performances are presented of a 427-meter-per-second-tip-speed two-stage fan designed with axially spaced blade rows to reduce noise transmitted upstream of the fan. At design speed the highest recorded adiabatic efficiency was 0.796 at a pressure of 2.30. Peak efficiency was not established at design speed because of a damper failure which terminated testing prematurely. The overall efficiencies, at 60 and 80 percent of design speed, peaked at approximately 0.83. Author

N78-33110*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DYGABCD: A PROGRAM FOR CALCULATING LINEAR A, B, C, AND D MATRICES FROM A NONLINEAR DYNAMIC ENGINE SIMULATION
Lucille C. Geyser Sep. 1978 203 p refs
(NASA-TP-1295; E-9464) Avail: NTIS HC A10/MF A01 CSCL 21E

A digital computer program, DYGABCD, was developed that generates linearized, dynamic models of simulated turbofan and turbojet engines. DYGABCD is based on an earlier computer program, DYNGEN, that is capable of calculating simulated nonlinear steady-state and transient performance of one- and two-spool turbojet engines or two- and three-spool turbofan engines. Most control design techniques require linear system descriptions. For multiple-input/multiple-output systems such as turbine engines, state space matrix descriptions of the system are often desirable. DYGABCD computes the state space matrices commonly referred to as the A, B, C, and D matrices required for a linear system description. The report discusses the analytical approach and provides a users manual, FORTRAN listings, and a sample case. L.S.

N78-33111# Naval Postgraduate School, Monterey, Calif.
STRESS ANALYSIS OF CERAMIC TURBINE BLADES BY FINITE ELEMENT METHOD, PART 1 M.S. Thesis
Lael Ray Easterling Mar. 1978 119 p refs
(AD-A056310; NPS69-78-009) Avail: NTIS HC A06/MF A01 CSCL 21/5

The search for more efficient gas turbine engines has led to the proposal for the replacement of metal high temperature components with ceramic components. Essential to this effort is the numerical analysis of proposed designs. This thesis report describes the model discretization of a proposed blade design, the development of pre- and post-processors for the ADINA finite element code and the initial stress analysis of the modeled blade. Author (GRA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N78-33112 City Univ. of New York.
A LEARNING CONTROL SYSTEM WITH APPLICATION TO FLIGHT SYSTEMS Ph.D. Thesis
Solomon Nachmias 1978 221 p
Avail: Univ. Microfilms Order No. 78-16144

The formulation of a learning control system and its utilization as a flight control system for NASA's F-8 Digital Fly-By-Wire (DFBW) research aircraft is presented. An artificial plant is also presented in order to illustrate the performance of the learning control system and to compare two different designs based upon two different information acquisition subsystems: (1) Liapunov's method and (2) Newton-Raphson method. In applying the learning control system to the piloted six-degree-of-freedom simulation of the F-8 aircraft, reduced order discrete models were used for the information acquisition subsystem to conform with the real-time constraint. Simulation experiments indicate that the learning control system was effective in compensating for parameter variations caused by changes in flight conditions over the entire flight envelope. Dissert. Abstr.

N78-33113*# General Dynamics/Fort Worth, Tex.
AN INVESTIGATION OF WING BUFFETING RESPONSE AT SUBSONIC AND TRANSONIC SPEEDS: PHASE 1: F-111A FLIGHT DATA ANALYSIS. VOLUME 1: SUMMARY OF TECHNICAL APPROACH, RESULTS AND CONCLUSIONS
David B. Benepe, Atlee M. Cunningham, Jr., and W. David Dunmyer 1978 188 p refs
(Contract NAS2-7091)
(NASA-CR-152109) Avail: NTIS HC A09/MF A01 CSCL 01C

The structural response to aerodynamic buffet during moderate to high-g maneuvers at subsonic and transonic speeds was investigated. The investigation is reported in three volumes. This volume presents a summary of the investigation with a complete description of the technical approach, description of the aircraft, its instrumentation, the data reduction procedures, results and conclusion. G.Y.

N78-33114*# General Dynamics/Fort Worth, Tex.
AN INVESTIGATION OF WING BUFFETING RESPONSE AT SUBSONIC AND TRANSONIC SPEEDS. PHASE 1: F-111A FLIGHT DATA ANALYSIS. VOLUME 2: PLOTTED POWER SPECTRA
David B. Benepe, Atlee M. Cunningham, Jr., and W. David Dunmyer 1978 282 p refs
(Contract NAS2-7091)
(NASA-CR-152110) Avail: NTIS HC A13/MF A01 CSCL 01C

Volume 2 of this three volume report is presented. This volume presents plotted variations of power spectral density data with frequency for each structural response item for each data sampled and analyzed during the course of the investigation. Some of the information contained in Volume 1 are repeated to allow the reader to identify the specific conditions appropriate to each plot presented and to interpret the data. G.Y.

N78-33115*# General Dynamics/Fort Worth, Tex.
AN INVESTIGATION OF WING BUFFETING RESPONSE AT SUBSONIC AND TRANSONIC SPEEDS. PHASE 2: F-111A FLIGHT DATA ANALYSIS. VOLUME 3: TABULATED POWER SPECTRA
David B. Benepe, Atlee M. Cunningham, Jr., and W. David Dunmyer 1978 319 p refs
(Contract NAS2-7091)
(NASA-CR-152111) Avail: NTIS HC A14/MF A01 CSCL 01C

Volume 3 of this three volume report is presented. This volume presents power spectral density in tabular form for the convenience of those who might wish to perform additional analysis. Some of the information contained in Volume 1 is again repeated (as in volume 2) in this volume to allow the reader to identify the specific conditions appropriate to each tabular listing and for further analysis. G.Y.

N78-33116*# General Dynamics/Fort Worth, Tex.
AN INVESTIGATION OF WING BUFFETING RESPONSE AT SUBSONIC AND TRANSONIC SPEEDS. PHASE 2 F-3A FLIGHT DATA ANALYSIS. VOLUME 1: SUMMARY OF TECHNICAL APPROACH, RESULTS AND CONCLUSIONS
David B. Benepe, Atlee M. Cunningham, Jr., Sam Traylor, Jr., and W. David Dunmyer 1978 150 p refs
(Contract NAS2-7091)
(NASA-CR-152112) Avail: NTIS HC A07/MF A01 CSCL 01C

A detailed investigation of the flight buffeting response of the F-111A was performed in two phases. In Phase 1 stochastic analysis techniques were applied to wing and fuselage responses for maneuvers flown at subsonic speeds and wing leading edge sweep of 26 degrees. Power spectra and rms values were obtained. This report gives results of Phase 2 where the analyses were extended to include maneuvers flown at wing leading edge sweep values of 50 and 75.5 degrees at subsonic and supersonic speeds and the responses examined were expanded to include vertical shear, bending moment, and hingeline torque of the left and right horizontal tails. Power spectra, response time histories, variations of rms response with angle of attack and effects of wing sweep and Mach number are presented and discussed. Some Phase 1 results are given for comparison purposes. G.Y.

N78-33117*# General Dynamics/Fort Worth, Tex.
AN INVESTIGATION OF WING BUFFETING RESPONSE AT SUBSONIC AND TRANSONIC SPEEDS. PHASE 2: F-111A FLIGHT DATA ANALYSIS. VOLUME 2: PLOTTED POWER SPECTRA
David B. Benepe, Atlee M. Cunningham, Jr., Sam Traylor, Jr., and W. David Dunmyer 1978 724 p refs
(Contract NAS2-7091)
(NASA-CR-152113) Avail: NTIS HC A99/MF A01 CSCL 10A

Plotted power spectra for all of the flight points examined during the Phase 2 flight data analysis are presented. Detailed descriptions of the aircraft, the flight instrumentation and the analysis techniques are given. Measured and calculated vibration mode frequencies are also presented to assist in further interpretation of the PSD data. G.Y.

N78-33118*# General Dynamics/Fort Worth, Tex.
AN INVESTIGATION OF WING BUFFETING RESPONSE AT SUBSONIC AND TRANSONIC SPEEDS. PHASE 2: F-111A FLIGHT DATA ANALYSIS. VOLUME 3: TABULATED POWER SPECTRA
David B. Benepe, Atlee M. Cunningham, Jr., Sam Traylor, Jr., and W. David Dunmyer 1978 286 p refs
(Contract NAS2-7091)
(NASA-CR-152114) Avail: NTIS HC A13/MF A01 CSCL 01C

Power spectral density (PSD) data for all of the flight points examined during the Phase 2 flight data analysis are presented in tabular form. Detailed descriptions of the aircraft, the flight instrumentation and the analysis techniques are given. Measured and calculated vibration mode frequencies are also presented to assist in further interpretation of the PSD data. G.Y.

N78-33119# Federal Aviation Administration, Washington, D. C. Systems Research and Development Service.
ENGINEERING AND DEVELOPMENT PROGRAM PLAN: ADVANCED INTEGRATED FLIGHT SYSTEMS (AIFS)
May 1978 83 p refs
(AD-A056770; FAA-ED-18-3) Avail: NTIS HC A05/MF A01 CSCL 01/3

It appears that active controls and digital flight control and avionics will significantly impact transport aircraft technology, and therefore, FAA must examine the impact of these advances on airworthiness criteria. To comply with its charged responsibilities, the FAA must stay abreast of technology advancements and establish the necessary safety standards. In the areas of active controls technology and digital flight control and avionics, a technology program entitled Advanced Integrated Flight Systems (AIFS) was established to support this responsibility. L.S.

N78-33120# Systems Research Labs., Inc., Dayton, Ohio.
A THEORY FOR LONGITUDINAL SHORT-PERIOD PILOT INDUCED OSCILLATIONS Interim Report, Nov. 1975 - Apr. 1977
Ralph H. Smith Jun. 1977 141 p refs
(Contract F33615-77-C-3011)
(AD-A056982; AFFDL-TR-77-57) Avail: NTIS HC A07/MF A01 CSCL 05/8

This report presents a theory for longitudinal, short-period, pilot-induced oscillations (PIO). The theory explains how the airplane's pitch attitude and normal acceleration modes can couple

with pilot dynamics to produce large-amplitude, uncontrollable oscillations. The effects of control system dynamics and feel system nonlinearities are encompassed by this theory. It is concluded that an airplane's potential for PIO can be determined based entirely on linear systems analysis; the prediction of fully-developed PIO frequency and amplitude requires that all significant nonlinearities be considered. The theory postulates that PIO can develop either as a result of closed loop control of pitch attitude or from abrupt control or atmospheric inputs of size sufficient to excite a lightly damped, dominant, stick-free airplane mode. A number of PIO case histories are examined; it is shown that these confirm the proposed theory. The implications of the theory to flight test and to simulation are discussed. A generalized definition for PIO is given which permits distinctions to be made between pilot-vehicle system oscillations due only to attitude control and those due to attitude plus path control modes. It is suggested that the theory can be easily extended to the study of lateral-directional PIO. A bibliography of PIO source material is included with this report. Author (GRA)

N78-33121# Sandia Labs., Albuquerque, N. Mex.
HYBRID COMPUTER STUDY OF THE SENSITIVITY OF AIRCRAFT DYNAMICS TO AERODYNAMIC CROSS-COUPLING
W. H. Curry and K. J. Orlik-Rueckemann (National Aeronautical Establishment, Ottawa) 1978 16 p refs Presented at AGARD Symp. on Dynamic Stability Parameters, Athens, 29-31 May 1978
(Contract EY-76-C-04-0789)
(SAND-77-1309C; Conf-780524-1) Avail: NTIS HC A02/MF A01

The sensitivity of the predicted motion time histories to aerodynamic cross coupling between the longitudinal and the lateral degrees of freedom was examined. A hybrid computer was utilized for the six-degree-of-freedom flight simulations required to evaluate the effects of aerodynamic cross-coupling derivatives. Noticeable effects of aerodynamic cross-coupling were recorded in flight simulations of a fighter aircraft at high angle of attack when perturbed from straight and level flight. ERA

N78-33122# National Technical Information Service, Springfield, Va.
CLOSED LOOP CONTROL SYSTEMS. PART 1: AIRCRAFT. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Mar. 1975 - Jul. 1978
Guy E. Habercom, Jr. Aug. 1978 127 p Supersedes NTIS/PS-77/0800
(NTIS/PS-78/0809/0; NTIS/PS-77/0800) Avail: NTIS HC $28.00/MF $28.00 CSCL 01C

Adaptive control and feedback control closed loop systems relative to aircraft flight control are investigated. Studies on guidance and control of drones and remotely piloted vehicles are included. GRA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N78-33123*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STATIC PRESSURE ORIFICE SYSTEM TESTING AND APPARATUS Patent Application
Randolph F. Culotta and Donald L. Posey, inventors (to NASA) Filed 17 Aug. 1978 14 p
(NASA-Case-LAR-12269-1; US-Patent-Appl-SN-934576) Avail: NTIS HC A02/MF A01 CSCL 14B

A method and apparatus for pressure testing the static pressure orifices and associated connections used in wind tunnels is presented. A cylindrical module, having in one end an open hemispherical calibration pressure chamber separated from and surrounded by an annular vacuum chamber, is placed over the orifice of the system to be tested. Ports lead from each of the chambers out the other end of the module to tubes connected to a control box consisting of calibration pressure and vacuum supply lines, bleeder valves, and gauges. The vacuum chamber is evacuated to seat the module and seal off the system. The center chamber is pressurized, and the control box pressure gauge is monitored for changes which would indicate leaks in the system. Comparison against the control box pressure gauge allows for calibration of the orifice system pressure receiving gauge. NASA

N78-33124# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT OF A SYMBOLOGY EXERCISER FOR DISPLAY GENERATION AND ANALYSIS ON THE VISUALLY-COUPLED AIRBORNE SYSTEMS SIMULATOR (VCASS) M.S. Thesis
Hollace H. Warner Mar. 1978 170 p refs
(AD-A055464; AFIT/GCS/EE/78-8) Avail: NTIS HC A08/MF A01 CSCL 05/9

The Visually-Coupled Airborne Systems Simulator (VCASS) is being developed by the Aerospace Medical Research Laboratory to aid in lowering the cost and increasing the performance of aircraft simulators. An important prerequisite for the VCASS display development is a symbology exerciser that will allow the display presentation designer to rapidly and accurately design new display formats to be tested for the VCASS system. The Symbology Exerciser development was begun by first doing a requirements analysis to establish the functions of the software. The analysis was performed by using a graphical technique which relates the activities and the input, output, and control data. Once the functional requirements were established, the data required by a visual display was analyzed in preparation for the software design. Finally, a structured design technique was applied to produce a software design which has high cohesion and low coupling. The design is presented by using structure charts, input/output lists, and module descriptions. Author (GRA)

N78-33125# Systems Technology, Inc., Hawthorne, Calif.
SOLID STATE DATA ACQUISITION AND PROCESSING SYSTEM (SSDAPS). VOLUME 3: DESCRIPTION, INSTALLATION, CALIBRATION, AND OPERATING PROCEDURES Final Report
Arthur A. Blauvelt, Richard A. Peters, and Duane T. McRyer Sep. 1977 335 p refs
(Contract DOT-HS-5-01212)
(PB-282402/7; STI-TR-1067-1-3; DPT-HS-803-311-Vol-3) Avail: NTIS HC A15/MF A01 CSCL 13F

A portable data acquisition and analysis system is described. The system is designed for studies of vehicle dynamics, braking, and driver behavior. As such it consists of a full complement of instrumentation sensors; data acquisition and signal conditioning modules; 62 channel FM/VHF digital telemetry (46 active at this time); and base station with PDP-11 minicomputer, teletype, and digital magnetic tape drive. Several unique features include onboard computations of sideslip velocity and lateral position, road referenced accelerations, and drive line torque, plus an interactive driver display panel. GRA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N78-33126# Defence Scientific Information Service, Ottawa (Ontario).
CANADA IN SPACE
1978 153 p Original contains color illustrations
Avail: NTIS HC A08/MF A01

Current Canadian policy objectives and programs in space are reviewed. Topics include the roles and objectives of the government departments and agencies closely associated with space, major space programs in which Canada is presently involved, Canada's industrial space capability and space research being done in Canadian universities. A.R.H.

N78-33127*# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
PIONEER JUPITER ORBITER PROBE MISSION 1980, PROBE DESCRIPTION
R. E. DeFrees 8 Nov. 1974 51 p ref
(Contract NAS2-8377)
(NASA-CR-137591) Avail: NTIS HC A04/MF A01 CSCL 22A

The adaptation of the Saturn-Uranus Atmospheric Entry Probe (SUAEP) to a Jupiter entry probe is summarized. This report is extracted from a comprehensive study of Jovian missions, atmospheric model definitions and probe subsystem alternatives. G.G.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N78-33128# Prototype Development Associates, Inc., Santa Ana, Calif.
HARDENED REENTRY VEHICLE DEVELOPMENT PROGRAM. EROSION-RESISTANT NOSETIP TECHNOLOGY Final Report, Dec. 1974 - Sep. 1976
M. M. Sherman Jan. 1978 239 p refs
(Contract DNA001-75-C-0054)
(AD-A056390; AD-E300253; PDA-TR-1031-90-58; DNA-4507F) Avail: NTIS HC A11/MF A01 CSCL 16/3

A series of programs has been conducted to develop erosion-resistant nosetip (ERN) concepts to provide an all-weather flight capability for high-performance reentry vehicles. In a previous effort, two ERN designs utilizing monolithic (solid) tungsten subtips were designed for flight tests on Advanced Nosetip Test (A.N.T.) vehicles. In the present program, ground tests were conducted in a rocket motor test facility to evaluate the thermal and structural performance of full-scale models of these flight designs. The results of these tests indicated a low probability of survival for monolithic tungsten subtips in ICBM flight environments. Therefore, additional studies were performed to develop an improved subtip concept that would be more resistant to thermal stress failures. These studies resulted in a segmented construction approach that will reduce the applied thermal stresses to acceptable levels and provide a high probability of survival in flight. Two segmented and two monolithic tungsten subtips were then designed, fabricated, and tested on HEARTS and FLAME flight test vehicles. All four nosetips survived to impact with no evidence of thermostructural failure and with no development of vehicle trim angles-of-attack at low altitudes. Additional tests at more severe conditions are required to verify the improvement in thermal stress performance provided by the segmented construction technique. GRA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

N78-33129# General Accounting Office, Washington, D. C. Procurement and Systems Acquisition Div.
OPERATIONAL TESTING OF AIR FORCE SYSTEMS REQUIRES SEVERAL IMPROVEMENTS Report to the Congress
2 Jun. 1978 32 p
(PB-281796/3; PSAD-78-102) Avail: NTIS HC A03/MF A01 CSCL 14B

Established in 1974, the Air Force Test and Evaluation Center is responsible for managing Air Force operational test and evaluation and providing information on test results to the Secretary of the Air Force and the Air Force Chief of Staff. GAO found that the test center has improved Air Force operational testing. However, increased test realism, additional test resources, better test criteria, and more dedicated operational testing are needed. This report contains recommendations to the Secretary of Defense on these issues. GRA

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N78-33130* National Aeronautics and Space Administration, Washington, D. C.
SECOND HIGH ENERGY ASTRONOMY OBSERVATORY LAUNCH SET
9 Nov. 1978 32 p
(NASA-News-Release-78-165; P78-10178) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 22A

A press release concerning some of the following is presented: (1) HEAO 1 science results; (2) HEAO spacecraft and observatory; (3) Launch vehicle; and (4) HEAO launch operations. B.B.

N78-33131# Mitre Corp., Bedford, Mass.
AFSATCOM LIFE CYCLE COST MODEL
J. H. James and W. M. Stein Jun. 1978 150 p refs
(Contract F19628-77-C-0001)
(AD-A056102; MTR-3057; ESD-TR-78-114) Avail: NTIS HC A07/MF A01 CSCL 15/5

A Life Cycle Cost (LCC) mathematical model has been developed for the Air Force Satellite Communications System (AFSATCOM). The model (under FORTRAN program name SITELCC) has been used in various tradeoff analyses involving acquisition costs, operation and support costs, and system performance. The AFSATCOM LCC Model provides for three echelons of maintenance, for communications terminal configurations of black boxes which may differ from base to base, and for reliability data which is a function of operating environment. In addition to LCC, the model calculates terminal availability as a result of initial sparing levels computed. This report presents the detailed structure of the model. A description of the output reports with illustration from a sample model run is included. Author (GRA)

N78-33132# Naval Surface Weapons Center, Dahlgren, Va.
NONLINEAR ROLLING MOTION ANALYSIS OF A CANARD-CONTROLLED MISSILE CONFIGURATION AT ANGLES OF ATTACK FROM 0 TO 30 DEGREES IN INCOMPRESSIBLE FLOW Final Report
Samuel R. Hardy May 1978 68 p refs
(AD-A056695; NSWC/DL-TR-3808) Avail: NTIS HC A04/MF A01 CSCL 20/4

Dynamic subsonic wind tunnel test data are presented for four canard-controlled missile configurations at angles of attack from 0 to 30 deg. The configurations included three body build-up configurations (canard plus body, body plus tail, and canard plus body plus tail) with zero fin deflections. A canard plus body plus tail configuration with a 15 deg canard pitch control deflection was also tested. Nonlinear static and dynamic roll moment coefficients were extracted from the test data by fitting a differential equation of rolling motion to the test data using a global nonlinear least-squares procedure. The results indicated that the equation of motion was adequate to describe the canard-controlled configurations: rolling motion. Extracted linear roll damping coefficients showed that the roll damping moment is a nonlinear function of angle of attack for all the configurations. Roll damping was also found to vary with the missiles: roll angle at angles of attack above 20 peg. The results for the body build-up configurations show that there is a significant canard/tail interference present on the canard plus body plus tail configuration. The canard contribution to the induced roll moment is small. The results for the canard plus body plus tail configuration with the 15 deg pitch control deflection on

the canards show that the canard deflection generally increases the roll damping moment. Author (GRA)

N78-33133# National Environmental Satellite Service, Washington, D. C.
IN-ORBIT STORAGE OF NOAA-NESS STANDBY SATELLITES
Bruce Sharts and Chris Dunker Sep. 1977 10 p refs
(PB-283078/4; NOAA-TM-NESS-91; NOAA-78050804) Avail: NTIS HC A02/MF A01 CSCL 22B

An operational proposal is presented for the orderly storage, in-orbit, of NOAA-NESS satellites that are in some degree of standby condition. This scheme reduces to a reasonable minimum the monitoring of these satellites by the NESS ground system. GRA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N78-33134*# Lockheed Missiles and Space Co., Huntsville, Ala. Research and Engineering Center.
DEVELOPMENT OF BASE PRESSURE SIMILARITY PARAMETERS FOR APPLICATION TO SPACE SHUTTLE LAUNCH VEHICLE POWER-ON AERODYNAMIC TESTING Final Report
Peter R. Sulyma and Morris M. Penny Sep. 1978 156 p refs
(Contract NAS8-32658)
(NASA-CR-150826; LMSC-HREC-TR-D568366) Avail: NTIS HC A08/MF A01 CSCL 22B

A base pressure data correlation study was conducted to define exhaust plume similarity parameters for use in Space Shuttle power-on launch vehicle aerodynamic test programs. Data correlations were performed for single bodies having, respectively, single and triple nozzle configurations and for a triple body configuration with single nozzles on each of the outside bodies. Base pressure similarity parameters were found to differ for the single nozzle and triple nozzle configurations. However, the correlation parameter for each was found to be a strong function of the nozzle exit momentum. Results of the data base evaluation are presented indicating an assessment of all data points. Analytical/experimental data comparisons were made for nozzle calibrations and correction factors derived, where indicated for use in nozzle exit plane data calculations. L.S.

N78-33135*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NITRIC OXIDE PRODUCTION IN THE STRATOSPHERE WITHIN THE SPACE SHUTTLE'S SOLID ROCKET MOTOR PLUMES
Richard I. Gomberg, James R. Brannan, and Lillian R. Boney Oct. 1978 31 p refs
(NASA-TP-1305; L-12182) Avail: NTIS HC A03/MF A01 CSCL 04A

This study focuses on establishing the sensitivity of predictions of NO production to uncertainties in altitude, reaction rate coefficients, turbulent mixing rates, and Mach disk size and location. The results show that relatively large variations in parameters related to these phenomena had surprisingly little effect on predicted NO production. Author

N78-33136# Aerospace Corp., El Segundo, Calif. Guidance and Control Div.
STATION KEEPING OF THE SPACE SHUTTLE IN THE VICINITY OF A DEPLOYED PAYLOAD Interim Report
Wayne A. Fey 1 May 1978 27 p ref
(Contract F04701-77-C-0078)
(AD-A056109; TR-0078(3451-03)-1; SAMSO-TR-78-102) Avail: NTIS HC A03/MF A01 CSCL 22/3

It is desirable for the Orbiter of the Space Shuttle to remain in the vicinity of a payload after it is deployed in orbit to allow for visual inspection. A station keeping mode at constant distance from the payload (as limited by safety considerations) was devised. Examples of other station keeping modes are presented; the maximum distance from the payload tends to be substantially in excess of the minimum. In all cases, station keeping orbits are planar ellipses relative to the payload. The adequacy of visual inspection of the payload depends on the attitude control mode of the payload, the station keeping orbit, and the line of sight required relative to the payload surface. Multiple station keeping orbits or commanded rotation of the payload may be required for adequate visibility. Author (GRA)

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N78-33137*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMAL CHARACTERISTICS OF THE 12-GIGAHERTZ, 200-WATT OUTPUT STAGE TUBE FOR THE COMMUNICATIONS TECHNOLOGY SATELLITE
Arthur N. Curren Oct. 1978 39 p refs
(NASA-TP-1344; E-9560) Avail: NTIS HC A03/MF A01 CSCL 17B

A description of the methods used to measure component temperatures and heat-rejection rates in a simulated space environment on output stage tubes (OST's) developed for the Communications Technology Satellite is presented along with summaries of experimentally determined values. The OST's were operated over the entire anticipated operating drive range, from the dc beam (zero drive) condition to the 6-db overdrive condition. The baseplate temperature was varied from -10 to 58 C with emphasis placed on the testing done at 45 C, the normal anticipated operating temperature. The heat-rejection rate of the OST baseplate ranged from 7.6 W at the dc beam condition to 184.5 W at the 6-db overdrive condition; the heat-rejection rate of the multistage depressed collector (MDC) cover ranged from 192.2 to 155.9 W for the same conditions. The maximum OST temperature measured on the MDC cover was 227 C during a dc beam test. The minimum temperature measured, also on the MDC cover, was -67.5 C at the end of an extended simulated eclipse test period. No effects were observed on the OST thermal characteristics due to vibration testing or temperature-reversal cycle testing. Author

N78-33138# Develco, Inc., Sunnyvale, Calif.
UNDERGROUND DATA ACQUISITION AND TELEMETRY SYSTEM Final Report, 10 Jun. 1974 - 30 Sep. 1976
T. C. Moore, L. H. Rorden, D. H. Nitta, A. Weston, and C. Kuong 28 Feb. 1977 264 p refs
(Contract DNA001-74-C-0298)
(AD-A056317; AD-E300249) Avail: NTIS HC A12/MF A01 CSCL 09/6

Three DEVELCO Underground Telemetry Systems were installed as part of the DNA Mighty Epic Nuclear Test Event interface experiment on 12 May 1976. These systems were designed to withstand strong shock and high pressures in order to acquire, store, and later telemeter multiple channels of ground motion data from high stress regions at depths greater than 1500 feet without relying on signal cables through the interface zone. In addition to recording significant new data, the Mighty Epic operation demonstrated that data storage and retrieval can be successfully accomplished under severe environmental conditions. Author (GRA)

N78-33139# Bendix Corp., Kansas City, Mo.
TELEMETRY TEST METHODS Final Report
J. L. Bowers, D. L. Bullard, and T. R. Schelp Apr. 1978 36 p refs
(Contract EY-76-C-04-0613)
(BDX-613-1811-Rev) Avail: NTIS HC A03/MF A01

A flexible test system was studied and proposed to provide an extensive evaluation and testing capability for telemetry products. A distributed computer controlled, modular unit test system using Computer Automated Measurement and Control (CAMAC) standard hardware and compatible software was selected because of its flexibility of application and long term cost effectiveness. ERA

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N78-33140* National Aeronautics and Space Administration, Washington, D. C.
FROM SPACE ON A PARACHUTE
N. Lobanov Oct. 1978 9 p Transl. into ENGLISH from Aviat. Kosmonavt. (USSR), no. 19, Sep. 1978 p 34-35 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75577) Copyright. Avail: NTIS HC A02/MF A01 CSCL 22B

Improvements in the landing system of the Soyuz spacecraft are discussed. The system of parachutes is designed to guarantee a safe landing. The design attempts to cover all possible emergency situations. Selection of the landing area and time of ejection is an important aspect of safe descent. Author

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

N78-33141# Northeastern Univ., Boston, Mass. Electronics Research Lab.
A DIGITAL CONTROL UNIT FOR A ROCKET BORNE QUADRUPOLE MASS SPECTROMETER Scientific Interim Report
J. Spencer Rochefort and Raimundas Sukys Apr. 1978 37 p refs
(Contract F19628-76-C-0256)
(AD-A057251; AFGL-TR-78-0106; SR-1) Avail: NTIS HC A03/MF A01 CSCL 09/5

To control a quadrupole mass spectrometer during a rocket flight a programmable digital control unit has been developed. The design centers around a programmable read only memory. Up to eight different programs of 16 breakpoints may be sequentially selected. For data transmission, a PCM system has been included into the control unit. The operation and the circuits of the unit are described. Author (GRA)

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N78-33142*# Aerojet Liquid Rocket Co., Sacramento, Calif.
DUAL THROAT THRUSTER COLD FLOW ANALYSIS Final Report
R. B. Lundgreen, G. R. Nickerson, and C. J. OBrien Aug. 1978 128 p refs
(Contract NAS8-32666)
(NASA-CR-150822) Avail: NTIS HC A07/MF A01 CSCL 21/4

The concept was evaluated with cold flow (nitrogen gas) testing and through analysis for application as a tripropellant engine for single-stage-to-orbit type missions. Three modes of operation were tested and analyzed: (1) Mode 1 Series Burn, (2) Mode 1 Parallel Burn, and (3) Mode 2. Primary emphasis was placed on the Mode 2 plume attachment aerodynamics and performance. The conclusions from the test data analysis are as follows: (1) the concept is aerodynamically feasible, (2) the performance loss is as low as 0.5 percent, (3) the loss is minimized by an optimum nozzle spacing corresponding to an AF-ATS ratio of about 1.5 or an Le/Rtp ratio of 3.0 for the dual throat hardware tested, requiring only 4% bleed flow, (4) the Mode 1 and Mode 2 geometry requirements are compatible and pose no significant design problems. L.S.

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N78-33143# Battelle Columbus Labs., Ohio.
REVIEW OF THE LOW-TEMPERATURE PROPERTIES OF METALS: A DIGEST OF SELECTED LITERATURE
6 Oct. 1978 8 p refs Sponsored in part by the Metals Properties Council, New York
(Contract DLA900-78-C-1715)
Avail: NTIS HC A02/MF A01

Results of tensile and fracture toughness tests on sheets of specimens of 2219-T87 aluminum alloy are presented for cryogenic pressure vessels. Fracture toughness of Mn-Si-Cr-Ni-Mo steel to -196 C is reported. Cryogenic properties of ferritic alloys Fe-12Mn-0.2Ti and Fe-8Mn-0.2Ti improved by special processing along with properties of Fe-26Cr alloys is also discussed. Mechanical properties of hard superconductors at cryogenic temperatures and the elastic properties of Nb-Ti/Cu superconducting composite are reviewed. Graphs are provided to enhance the review. G.Y.

N78-33144# Battelle Columbus Labs., Ohio.
REVIEW OF THE LOW-TEMPERATURE PROPERTIES OF METALS: A DIGEST OF SELECTED LITERATURE
7 Jun. 1978 5 p refs Sponsored in part by the Metal Properties Council, New York
(Contract DSA900-76-2471)
Avail: NTIS HC A02/MF A01

Tensile properties and fatigue crack-growth rates for 99.99 aluminum at room temperature and 77 K are reported. Results of rotating-beam fatigue tests on aluminum alloys at room temperature and -196 C are summarized. Results of estimating K sub 1c values from tests on subsize specimens at room temperature and -196 C are also summarized. Properties of 9Ni steel produced by Japan are discussed. Soviet research on low-alloy steels for application to -196 C is also discussed. Fabrication of large spherical tanks for ship transport of liquid natural gas is reviewed. G.Y.

24 COMPOSITE MATERIALS

Includes laminates.

N78-33145 Washington State Univ., Pullman.
ANALYSIS OF ELASTIC BEHAVIOR OF ORTHOTROPIC WOOD COMPOSITE PLATES Ph.D. Thesis
Wu-Hsing Ernest Hsu 1978 199 p
Avail: Univ. Microfilms Order No. 7811896

Thin plate theory for small deflections was used to ascertain and compare the bending behavior of typical wood composite plates having widely differing properties due to the various raw

materials and processing conditions employed in their production. Major variability was induced in the flakeboards by using different degrees of orientation, different density levels, and different kinds of flakes. Finite element analysis determined theoretical deflections and the effect of density variation within the plate. The elastic properties of the plates vary in different directions because of flake orientation and the effects of flake orientation vary with the aspect ratio, loading, and support conditions. Dissert. Abstr.

N78-33146 Utah Univ., Salt Lake City.
MECHANICAL AND THERMAL PROPERTIES OF SIALON ALUMINA COMPOSITES Ph.D. Thesis
Jose Roberto Casarini 1978 114 p
Avail: Univ. Microfilms Order No. 7815526

A two-phase ceramic composite was studied. Because of a difference in thermal expansion when an inclusion of one phase is dispersed in the matrix of the other, internal stresses are produced. The interaction between the notch crack and these stresses is the object of this study. Given certain conditions the same stresses may lead to the production of microcracks. The thermal expansion and the elastic modulus of the composites are two of the properties used to demonstrate the presence of microcracks. The improvement in fracture toughness for composites of sialon inclusions in alumina is interpreted based on the presence of internal stress. Analysis of the internal stresses shows that, for alumina inclusions in sialon matrix, the notch crack should deviate from the inclusion. This was proved by an increase in roughness of the fracture surface. Dissert. Abstr.

N78-33147 Delaware Univ., Newark.
DYNAMIC CHARACTERIZATION OF POROELASTIC MATERIALS Ph.D. Thesis
Young-kil Kim 1978 162 p
Avail: Univ. Microfilms Order No. 7816931

A new but relatively simple method of determining the coefficients appearing in the poroelastic materials' constitutive equations is presented, and values of the coefficients for a variety of poroelastic materials are established using this method. The nature of the coefficients of poroelastic materials was thoroughly investigated with a review of the concepts and equations of poroelasticity. It was shown that four fundamental coefficients from which all others were to be derived were chosen. These fundamental coefficients depended separately on the properties of the skeleton, the solid material, or the fluid of the systems without the coupling effect between a flow and deformation. Three of these can be determined by ordinary simple tests or by known data from the literature. A method was described for independently determining two coefficients. The method was based on a standard technique for dynamically characterizing materials with strain rate, or frequency, dependent properties. Dissert. Abstr.

N78-33148*# Lockheed Corp., Burbank, Calif.
DEVELOPMENT OF GRAPHITE/POLYIMIDE HONEYCOMB CORE MATERIALS Final Report
Robert H. Stone Sep. 1978 70 p refs
(NASA-CR-158921) Avail: NTIS HC A04/MF A01 CSCL 11D

Honeycomb panel constructions consisting entirely of graphite/polyimide composites were developed and evaluated. Graphite/polyimide composites, were used in the honeycomb core webs and in pre-cured sandwich skins. Polyimide adhesives were also developed and evaluated for use in skin-core bonding. The purpose of this program was to develop light weight sandwich constructions for high temperature applications which could provide comparable shear strength and stiffness to metallic honeycomb constructions. Author

N78-33149*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYSIS/DESIGN OF STRIP REINFORCED RANDOM COMPOSITES (STRIP HYBRIDS)
C. C. Chamis and J. H. Sinclair 1978 23 p refs To be presented at the Annual Meeting of ASME, San Francisco, Calif., 10-15 Dec. 1978
(NASA-TM-78985; E-9733) Avail: NTIS HC A02/MF A01 CSCL 11D

Advanced analysis methods and composite mechanics were applied to a strip-reinforced random composite square panel with fixed ends to illustrate the use of these methods for the a priori assessment of the composite panel when subjected to complex loading conditions. The panel was assumed to be of E-glass random composite. The strips were assumed to be of three advanced unidirectional composites to cover a range of low, intermediate, and high modulus stiffness. The panels were assumed to be subjected to complex loadings to assess their adequacy as load-carrying members in auto body, aircraft engine nacelle and windmill blade applications. The results show that strip hybrid panels can be several times more structurally efficient than the random composite base materials. Some of the results are presented in graphical form and procedures are described for use of these graphs as guides for preliminary design of strip hybrids. A.R.H.

N78-33150*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ACOUSTIC EMISSION TESTING OF COMPOSITE VESSELS UNDER SUSTAINED LOADING
R. F. Lark and P. E. Moorhead 1978 25 p refs Presented at the Symp. on Nondestructive Evaluation and Flaw Criticality for Composite Mater., Philadelphia, 10-11 Oct. 1978 Sponsored by the Am. Soc. for Testing Mater.
(NASA-TM-78981; E-9759) Avail: NTIS HC A02/MF A01 CSCL 11D

Acoustic emissions (AE) generated from Kevlar 49/epoxy composite pressure vessels subjected to sustained load-to-failure tests were studied. Data from two different transducer locations on the vessels were compared. It was found that AE from vessel wall-mounted transducers showed a wide variance from those for identical vessels subjected to the same pressure loading. Emissions from boss-mounted transducers did, however, yield values that were relatively consistent. It appears that the signals from the boss-mounted transducers represent an integrated average of the emissions generated by fibers fracturing during the vessel tests. The AE from boss-mounted transducers were also independent of time for vessel failure. This suggests that a similar number of fiber fractures must occur prior to initiation of vessel failure. These studies indicate a potential for developing an AE test procedure for predicting the residual service life or integrity of composite vessels. A.R.H.

N78-33151*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ION BEAM SPUTTERING OF FLUOROPOLYMERS
J. S. Sovey 1978 15 p refs To be presented at the 25th Natl. Vacuum Symp., San Francisco, 28 Nov. 1978 - 1 Dec. 1978 Sponsored by the Am. Vacuum Soc.
(NASA-TM-79000; E-9784) Avail: NTIS HC A02/MF A01 CSCL 11D

Ion beam sputter processing rates as well as pertinent characteristics of etched targets and films are described. An argon ion beam source was used to sputter etch and deposit the fluoropolymers PTFE, FEP, and CTFE. Ion beam energy, current density, and target temperature were varied to examine effects on etch and deposition rates. The ion etched fluoropolymers yield cone or spire-like surface structures which vary depending upon the type of polymer, ion beam power density, etch time, and target temperature. Sputter target and film characteristics documented by spectral transmittance measurements, X-ray diffraction, ESCA, and SEM photomicrographs are included. A.R.H.

N78-33152*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IMPACT TESTS ON FIBROUS COMPOSITE SANDWICH STRUCTURES
Marvin D. Rhodes Oct. 1978 43 p refs
(NASA-TM-78719; L-12455) Avail: NTIS HC A03/MF A01 CSCL 11D

The effect of low velocity impact on the strength of laminates fabricated from graphite/epoxy and Kevlar 49/epoxy composite materials was studied. The test laminates were loaded statically either in uniaxial tension or compression when impact occurred to evaluate the effect of loading on the initiation of damage and/or failure. Typical aircraft service conditions such as runway debris encountered during landing were simulated by

impacting 1.27-cm-diameter projectiles normal to the plane of the test laminates at velocities between 5.2 and 48.8 m/s. G.G.

N78-33153*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN EVALUATION OF THE SANDWICH BEAM IN FOUR-POINT BENDING AS A COMPRESSIVE TEST METHOD FOR COMPOSITES
Mark J. Shuart and Carl T. Herakovich (Virginia Polytech. and State Univ., Blacksburg) Sep. 1978 106 p refs
(NASA-TM-78783) Avail: NTIS HC A06/MF A01 CSCL11D

The experimental phase of the study included compressive tests on HTS/PMR-15 graphite/polyimide, 2024-T3 aluminum alloy, and 5052 aluminum honeycomb at room temperature, and tensile tests on graphite/polyimide at room temperature, -157 C, and 316 C. Elastic properties and strength data are presented for three laminates. The room temperature elastic properties were generally found to differ in tension and compression with Young's modulus values differing by as much as twenty-six percent. The effect of temperature on modulus and strength was shown to be laminate dependent. A three-dimensional finite element analysis predicted an essentially uniform, uniaxial compressive stress state in the top flange test section of the sandwich beam. In conclusion, the sandwich beam can be used to obtain accurate, reliable Young's modulus and Poisson's ratio data for advanced composites; however, the ultimate compressive stress for some laminates may be influenced by the specimen geometry. G.G.

N78-33154# Air Force Materials Lab., Wright-Patterson AFB, Ohio. Mechanics and Surface Interactions Branch.
MOISTURE DIFFUSION IN FIBER REINFORCED COMPOSITES Interim Report, 1 Aug. 1977 - 1 Jan. 1978
James M. Whitney Apr. 1978 32 p refs
(AD-A056557; AFML-TR-78-42) Avail: NTIS HC A03/MF A01 CSCL 11/4

Moisture diffusion in graphite/epoxy composites is summarized. The mathematics of diffusion are presented with supporting experimental data. Anomalous behavior associated with diffusion in laminated composites is also discussed.
Author (GRA)

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N78-33155 Minnesota Univ., Minneapolis.
NUCLEAR MAGNETIC RESONANCE RELAXATION IN ACUEOUS PROTEIN SYSTEMS Ph.D. Thesis
Bruce David Hilton 1977 143 p
Avail: Univ. Microfilms Order No. 78-13406

Nuclear magnetic relaxation times of water protons in aqueous protein systems were measured in order to study water molecule motion in the vicinity of the water/protein interface. The temperature dependence of water proton relaxation times of hydrated protein powders is interpreted in terms of a distribution of correlation times and in terms of a cross relaxation model that couples water protons to protein protons; evidence is presented that strongly favors the cross-relaxation model. The water content dependence of water proton relaxation times of hydrated protein powders is used to demonstrate that water molecule motion increases as a function of protein powder water content. The measurement of water proton relaxation times of protein model systems, in particular, the frozen solutions of amino acids and of polypeptides is performed to aid the interpretation of the protein results. Dissert. Abstr.

N78-33156 Virginia Univ., Charlottesville.
PULSED POSITIVE NEGATIVE ION CHEMICAL IONIZATION MASS SPECTROMETRY Ph.D. Thesis
George Caterine Stafford 1977 124 p
Avail: Univ. Microfilms Order No. 7812138

A technique involving simultaneous recording of positive and negative ions is presented which allows accurate mass determination at low resolution on a quadrupole gas chromatography mass spectrometry system. Applications of this technique include analysis of complex mixtures of aromatic compounds and amino acid derivative determination. Dissert. Abstr.

N78-33157 California Univ., Berkeley.
VAPOR-LIQUID EQUILIBRIA IN MULTICOMPONENT AQUEOUS SOLUTIONS OF VOLATILE ELECTROLYTES Ph.D. Thesis
Thomas James Edwards 1977 157 p
Avail: Univ. Microfilms Order No. 7812552

A molecular-thermodynamic correlation was established for calculating the thermodynamics of aqueous solutions containing one or more volatile weak electrolytes: ammonia, carbon dioxide, hydrogen sulfide, sulfur dioxide, and hydrogen cyanide. The correlation holds from 0 to 170 C and for total solute concentrations to 10 molal. To represent activities at these high concentrations, activity coefficients are expressed as a function of molality. Required parameters, obtained from data reduction or estimated from correlations, are presented. An engineering-oriented computer program for the calculation of vapor-liquid equilibrium phase compositions is provided. An expression is proposed for representing the effect of composition on the activity coefficients of water and ammonia. Dissert. Abstr.

N78-33158 Minnesota Univ., Minneapolis.
A THEORETICAL STUDY ON OXIDATIVE CATALYTIC MONOLITHS Ph.D. Thesis
Sheng-Tai Lee 1977 221 p
Avail: Univ. Microfilms Order No. 7813423

The influence of thermal radiation exchanges inside of a laminar, fully-developed monolith channel combined with simultaneous processes of heat and mass transport and catalytic chemical reaction was studied. Examples are presented to show the influence of certain important parameters and to demonstrate how radiation alters the wall temperature distribution and carbon monoxide emission breakthrough that would exist without radiation occurring. Various approximations are discussed for the radiation effect. The influence of catalyst deactivation on the performance of a monolith channel is investigated for selective poisoning and non-selective poisoning of impurity in the feed. Effects of catalyst decay on the rates of inter-and-intra-phase heat and mass transport are discussed in terms of catalyst effectiveness factor, Nusselt and Sherwood numbers.
Dissert. Abstr.

N78-33159 California Univ., Berkeley.
MASS TRANSPORT AND ACID-BASE GENERATION IN SOLUTION/MEMBRANE SYSTEMS: EXTENSION OF NERNST-PLANCK TREATMENT TO ELECTROLYTIC MULTICOMPONENT SYSTEMS Ph.D. Thesis
Jaques Leibovitz 1977 148 p
Avail: Univ. Microfilms Order No. 7812653

A quantitative modeling of acid-base generation in electrodialysis cells, based on known physical relations, was developed and compared to experimental results from the literature for an anion-exchange membrane/solution interface. The basis for this treatment is the Nernst-Planck ion-flux equation. A method was developed for the mathematical analysis of one-dimensional mass transport for multicomponent systems in a stagnant medium with electrical field and concentration gradients. For dilute mixtures of any strong electrolytes, the treatment yields a simple restricted principle of superposition; it is shown that at steady state all concentration distributions are linear. Quantitative modeling of steady-state electrodialysis of dilute aqueous solutions of neutral 1:1 salts with the water participating as the weak electrolyte in the processes is discussed. Dissert. Abstr.

N78-33160 Purdue Univ., Lafayette, Ind.
MICROPROBE METHOD FOR STUDYING GAS-LIQUID OXYGEN TRANSFER IN VARIOUS SURFACTANT SYSTEMS Ph.D. Thesis
Young Hie Lee 1977 265 p
Avail: Univ. Microfilms Order No. 7813079

An ultramicro dissolved oxygen sensor (tip size of less than 1 um) a fast response time (time constant of less than 50 millisec) and a high spacial resolution, was developed and used to measure the concentration profiles at the phase boundary, the diffusivity and solubility of oxygen in liquids, and the hydrodynamic parameters such as the length scale and the velocity scale of the liquid motions. The effect of surfactant on mass transfer was investigated. The surfactant were experimentally shown to change both the length and the velocity scales of the liquid eddy motion at the surface region and this was chiefly responsible for reduction in mass transfer coefficient. Low molecular weight surfactants appear to be mainly effective in decreasing velocity scale, whereas both the length scale and the velocity scale were equally affected by macromolecular surfactants. Dissert. Abstr.

N78-33161 Brigham Young Univ., Provo, Utah.
METHANATION CATALYSTS: ACTIVITY, ADSORPTION AND DEGRADATION STUDIES OF NICKEL AND NICKEL BIMETALLIC CATALYSTS FOR METHANATION Ph.D. Thesis
Richard Byron Pannell 1978 189 p
Avail: Univ. Microfilms Order No. 7813813

Adsorption of hydrogen, carbon monoxide, oxygen and hydrogen sulfide, catalytic activity for methanation, and thermal degradation of nickel and nickel bimetallic catalysts were investigated. The adsorption of hydrogen on nickel powder was shown to be H/Ni=1. This ratio was also shown to be one on supported nickel catalysts from hydrogen chemisorption, X-ray line broadening and electron microscopy. CO adsorption was shown to depend upon pressure, temperature, composition and support. Oxygen adsorption is multilayer in nature and temperature dependent. Hydrogen sulfide adsorbs dissociatively and fully saturates nickel surfaces above 5 ppm in hydrogen. Activity tests show nickel and cobalt to be very active methanation catalysts. Metal loading and composition alter catalyst activity and product distribution, especially higher hydrocarbons. Adsorbed sulfur also alters activity and product distribution. Dissert. Abstr.

N78-33162 Georgia Univ., Athens.
STUDIES OF ELECTROGENERATED CHEMILUMINESCENCE Ph.D. Thesis
Francis Elwood Beideman, Jr. 1978 103 p
Avail: Univ. Microfilms Order No. 78-14932

The luminescent reactions of electrochemically generated 9,10-diphenyl anthracene radical cation with the radical anions of 1,4-benzo quinone, 1,4-naphtho quinone, 9,10-anthra quinone, phenanthrene quinon, 2-phenyl-1, 4 benzo quinone, 1,4-dimethyl-9,10-anthraquinone, 2-methyl-1,4-naphtha quinone, bianthronyl, 9-fluorenone, 2-naphthyl-phenyl ketone, benzo phenone, 4-methyl-benzo phenone, 4-methoxy-benzo phenone, 4-nitrobenzo phenone, benzil, benzoyl pyridine and 1,8-naphthaylene-2', 3'-naphthamidazole were studied. The cyclic voltammetric behavior of these systems were studied in benzonitrile, acetonitrile, and 50% volume-volume mixtures of benzene with acetonitrile and benzonitrile. The radical anion of 1,4-dimethyl-anthra quinone showed considerable filming of the platinum electrode. The 4-nitro-benzo phenone and benzoyl-pyridine had unstable radical anions. The other systems showed reversible, one electron reductions. Dissert. Abstr.

N78-33163 Utah Univ., Salt Lake City.
NEW TECHNIQUES FOR THE ANALYSIS OF THERMOLYSIS PRODUCTS Ph.D. Thesis
Frederick Dilger Hileman 1978 398 p
Avail: Univ. Microfilms Order No. 7815524

The application of gas chromatography and mass spectrometry to the analysis of the thermolysis products of a variety of materials is reported. Emphasis was placed on chemical ionization mass spectrometry as an analytical tool. A data file of compound identification parameters was assembled to aid in thermolysis product identification. Thermolysis products from several urethane foams were identified and a decomposition mechanism was formulated. Likewise, the thermolysis products of Douglas fir and alpha-cellulose were identified. Direct pyrolysis-mass spectrometry has permitted a unique insight into the nature of lignin by comparative pyrolysis of these two materials. Dissert. Abstr.

N78-33164*# National Aeronautics and Space Administration. Pasadena Office, Calif.
COAL DESULFURIZATION Patent Application
George C. Hsu, inventor (to NASA) (JPL) Filed 16 Feb. 1978 13 p Sponsored by NASA
(NASA-Case-NPO-14272-1; US-Patent-Appl-SN-878253) Avail: NTIS HC A02/MF A01 CSCL 07D

Organic sulfur is removed from coal by treatment with an organic solution of iron pentacarbonyl. Organic sulfur compounds can be removed by reaction of the iron pentacarbonyl with coal to generate CO and COS off-gases. The CO gas separated from COS can be passed over hot iron fillings to generate iron pentacarbonyl. NASA

N78-33165# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.
DESORPTION AND SURFACE DIFFUSION: NITROGEN ON TUNGSTEN (110) Ph.D. Thesis
Anthony James Polak Oct. 1977 171 p refs
(Contract DAAB07-72-C-0259; Grant NSF DMR-76-82088)
(AD-A056346; R-789; UILU-ENG-77-2236) Avail: NTIS HC A08/MF A01 CSCL 07/4

Scanning Auger spectroscopy has been used to monitor the migration of nitrogen atoms down a concentration gradient, on the (110) plane of tungsten. This concentration gradient is formed by the electron stimulated dissociation of molecular nitrogen, initially adsorbed at 95 K. These deposits are found to be thermally stable to several hundred K and unaffected by further electron irradiation. The adsorbed atoms form two different surface structures, depending upon the surface concentration. The desorption kinetics of both molecular and atomically bound nitrogen have been studied by a combination of Auger spectroscopy and flash desorption. The desorption of atomically bound nitrogen occurs as a second order process with an activation energy more than 7 times the activation energy of diffusion. Despite the large binding energy of the atomic nitrogen to the (110) surface, 153 kcal/mole, there is virtually no change in the work function upon adsorption. In addition the saturation coverage of the irradiated atomic nitrogen is found to be more than twice that of the nitrogen adsorbed at room temperature. Both are found to be in identical binding states. Author (GRA)

N78-33166# Birmingham Univ. (England). Dept. of Space Research.
BINARY POSITIVE ION-NEGATIVE ION MUTUAL NEUTRALIZATION REACTIONS Interim Scientific Report, 1 Apr. 1977-31 Mar. 1978
David Smith 31 May 1978 56 p refs
(Grant AF-AFOSR-3260-77)
(AD-A056649; AFGL-TR-78-0162) Avail: NTIS HC A04/MF A01 CSCL 07/4

The results are described of a study of the rate coefficients at thermal energies of several binary positive ion-negative ion mutual neutralization reactions. This includes reactions of the simpler molecular ions e.g., NO(-) - NO2(-) and those of the so-called cluster ions e.g., H3O(-)(H2O)n NO3(-)(HNO3)m. The ionic recombination coefficients alpha for all of these molecular ion reactions are similar being within the range (4 to 10) times 10 to the -8th power cu cm/sec in general accordance with theoretical predictions. The variation with temperature of two simple ion reactions have also been obtained and alpha varies as sq rt of (1/T), again in line with the theory. For several atomic ion reactions e.g., AR(-) Cl(-), alpha is much smaller than for reactions involving molecular ions. A spectroscopic study of one reaction (NO(-) - NO2(-)) has been carried out and data on the product neutral states have been obtained. Author (GRA)

N78-33167# Army Electronics Command, Fort Monmouth, N. J.
ELECTROCHEMICAL REDUCTION OF THIONYL CHLORIDE IN SOLUTIONS CONTAINING LITHIUM TETRACHLOROALUMINATE
K. Wishvender Behl Feb. 1978 12 p refs
(DA Proj. 1L1-61102-AH 47)
(AD-A056123; DELET-TR-78-5) Avail: NTIS HC A02/MF A01 CSCL 07/4

The electrochemical reduction of thionyl chloride in 0.5, 1.0, and 1.5 molar LiAlCl4-SOCl2 solutions was studied at glassy

carbon microelectrodes using the technique of cyclic voltammetry. It is shown that the reduction of thionyl chloride in these solutions occurs irreversibly and leads to the deposition of sparingly soluble lithium chloride on the electrode surface. The peak heights for the reduction of thionyl chloride increased linearly with the square root of voltage scan rate and at a fixed scan rate, the peak heights were found to be independent of the electrolyte concentration. Author (GRA)

N78-33168# Pennsylvania State Univ., University Park. Dept. of Chemistry.

HYDRIDOCYCLOPHOSPHAZENES: SYNTHESIS VIA ORGANOCOPPER REAGENTS Interim Technical Report

Harry R. Allcock and Paul J. Harris 1 Jun. 1978 8 p refs
(Contract N00014-75-C-0685)
(AD-A056094; TR-3) Avail: NTIS HC A02/MF A01 CSCL 07/3

1-Hydrido-1-methyl-tetrachlorocyclotriphosphazene (I) has been synthesized by the reaction of hexachlorocyclotriphosphazene with methylmagnesium chloride in the presence of (nBu3PCuI)4. This is the first time a hydrido-phosphazene compound has been synthesized by substitution on a preformed phosphazene skeleton. Author (GRA)

N78-33169# Delaware Univ., Newark. School of Engineering.

ELECTRO-OPTICAL STUDIES Final Report, 1 Nov. 1970 - 31 Dec. 1976

K. W. Boeer May 1978 43 p refs
(Contract N00014-71-C-0169)
(AD-A057062) Avail: NTIS HC A03/MF A01 CSCL 07/4

The near band edge photocurrent structure of Class I CdS crystals was investigated near 77 K and 295 K by use of double beam illumination techniques. Changes in the photocurrent structure as a consequence of heat treatment, infra-red illumination and oxygen backfill were measured. At 98 K, quenching of the photocurrent near 5000 A observed in a virgin crystal changed into photocurrent maxima after heat treatment to 175 C. At room temperature, the near band edge quenching remained even after heat treatment to 175 C. Visible and infra-red excitation ranging from 0.6 to 1.5 micrometers always strongly quenched the near band edge photoconductivity maxima but had considerably less influence on the intrinsic photocurrent. The currently-used model to explain Class I properties is expanded to include the influence of the space-charge region in which the photocurrent flows and an acceptor-level with multiply charged energy states. Author (GRA)

N78-33170# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Ballistics Research Lab.

PHOTODISSOCIATION CROSS SECTIONS FOR Ar SUB 2+, Kr SUB 2+, AND Xe SUB 2+ AT 3.0 AND 3.5 eV

John A. Vanderhoff Jun. 1978 14 p refs
(AD-A057195; AD-E430068; ARBRL-MR-02844) Avail: NTIS HC A02/MF A01 CSCL 07/5

Absolute photodissociation cross sections have been experimentally determined for the rare gas dimer ions of Ar, Kr, and Xe at photon energies of 3.0 and 3.5 eV. These measurements were conducted at room temperature (300 K) and experimental checks were made which indicate that the dimer ions were thermalized. Author (GRA)

N78-33171# Michigan State Univ., East Lansing. Dept. of Chemistry.

HIGH EFFICIENCY COLLISION-INDUCED DISSOCIATION IN AN RF-ONLY QUADRUPOLE Interim Report

R. A. Yost, C. G. Enke, D. C. McGilvery, D. Smith, and J. D. Morrison 25 Jul. 1978 25 p refs
(Contract N00014-76-C-1092)
(AD-A057201; TR-2) Avail: NTIS HC A02/MF A01 CSCL 07/4

Collision-induced dissociation (CID), when performed in an RF-only quadrupole is a highly efficient method of fragmenting ions. The low-energy (5-10 eV) CID process, may involve direct vibrational excitation by momentum transfer but in any case, is a very different process from the high energy (3-10 keV) electronic excitation CID process observed in MIKES and CAMS. Experimental results are presented which demonstrate the efficiency of CID fragmentation (up to 65%), the elimination of scattering losses, and the effects of varying such experimental parameters as choice and pressure of collision gas, ion velocity in the quadrupole, and quadrupole RF voltage and frequency. The appearance of the CID fragmentation spectra is roughly similar to 14 eV EI spectra. The results of digital simulation of ion trajectories in an RF-only quadrupole are presented. The correspondence between simulated and experimental results aids in the understanding of the quadrupole CID process. The high efficiency of the CID process in an RF-only quadrupole is significant in the development of a tandem quadrupole mass spectrometer for selected ion fragmentation studies. Author (GRA)

N78-33172# Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.

AN EXPERIMENTAL INVESTIGATION OF THE CRITICAL SUPERSATURATION OF FIVE VAPORS IN A SHOCK TUBE

C. F. Lee Jan. 1978 68 p refs
(Contract N00014-75-C-0263)
(AD-A056859; Rept-37) Avail: NTIS HC A04/MF A01 CSCL 07/4

Pressure measurements at three different locations in the driver section of a shock tube reveal that the expansion wave generated by diaphragm rupture can be effectively viewed as a simple centered expansion wave whose origin is slightly shifted with respect to the origin of an ideal x-t diagram. The resulting centered expansion wave is used to study the condensation of water, heavy water, benzene, carbon tetrachloride and Freon 11, in an excess of the non-condensing carrier argon. Simultaneous pressure and light scattering measurements determine the onset of condensation. The isentropic flow within the expansion wave is found to be preserved up to the point of the detectable onset of condensation by tailoring the onset conditions to occur at the tail of the expansion wave, thus rendering a simple analysis of the experiments possible. GRA

N78-33173# Illinois Univ. at Urbana-Champaign, Urbana. Dept. of Physics.

LUMINESCENT DECAY AND SPECTRA OF IMPURITY-ACTIVATED ALKALI HALIDES UNDER HIGH PRESSURE Ph.D. Thesis

David Ira Klick 1977 204 p refs
(Contract EY-76-C-02-1198)
(COO-1198-1191) Avail: NTIS HC A10/MF A01

The effect of high pressure on the luminescence of alkali halides doped with the transition metal ions Cu(+) and Ag(+) and the heavy metal ions In(+) and Tl(+) was investigated to 140 kbar. Measurement of spectra allowed the prediction of kinetic properties, and the predictions agree with lifetime data. ERA

N78-33174# California Univ., Livermore. Lawrence Livermore Lab.

SUB-PART-PER-TRILLION DETECTION OF ORGANICS IN AQUEOUS SOLUTION BY LASER INDUCED MOLECULAR FLUORESCENCE

J. H. Richardson, S. M. George, and M. E. Ando Mar. 1978 17 p refs Presented at 9th Symp. on Trace Organic Anal., Gaithersburg, Md., 10-13 Apr. 1978
(Contract W-7405-eng-48)
(UCRL-80038; Conf-780434-1) Avail: NTIS HC A02/MF A01

Pulsed laser irradiation was demonstrated to be a superior excitation source for fluorescence analysis. Three different configurations were compared experimentally, and the superior system used as the excitation source in the trace analysis of several organics in aqueous solutions. In favorable cases sub-part-per-trillion detection limits can be achieved. ERA

N78-33175# Connecticut Univ., Storrs. Dept. of Chemical Engineering.

LIQUIDS FROM CO AND H2 FOR ENERGY STORAGE Final Report

C. O. Bennett Mar. 1978 183 p refs Sponsored by Elec. Power Res. Inst.
(EPRI Proj. 541)

(EPRI-AF-689) Avail: NTIS HC A09/MF A01

A number of catalysts were experimentally compared for their activity in the Fischer-Tropsch synthesis. The best catalyst is a promoted, nitrided fused-iron commercial ammonia synthesis catalyst. Intrinsic rate measurements were made over this catalyst for a 2/1 H2/CO feed at 20-atm (2.0 MPa) in the temperature range 250 to 315 C. These kinetic data were then used in the computer simulation of a large-scale, heat-exchanger type reactor. ERA

N78-33176# General Electric Co., St. Petersburg, Fla. Dept. of Neutron Devices.

CALCIUM CHROMATE SYNTHESIS: PROCESS VARIABLES STUDY

B. M. Dillard 1 May 1978 23 p refs

(Contract EY-76-C-04-0656)

(GEPP-372) Avail: NTIS HC A02/MF A01

Process variables affecting the synthesis of calcium chromate were studied. The variables were molar ratios of reactants, substitution of anhydrous for aqueous ammonia, molality of chromic acid, rate of addition of precipitating agent, and digestion times and temperatures. Results indicate that a product of higher purity and lower hydroxide ion concentration was obtained by use of a molar ratio of reactants of 2.1 : 1.1 : 1.0 (NH4OH : CrO3 : CaO). The molality of the chromic acid had no effect on product purity over the range studied, but a significantly higher yield was obtained using chromic acid concentrations of 4.0 to 7.0 molal. A rate of lime addition from 0.3 to 1.5 liters per minute (4 to 17 minutes total addition time) produced a product of higher purity as compared to slower rates of addition. A digestion temperature of 80 C for 2 hours yielded a product of higher purity along with a high percent yield. ERA

N78-33177# California Univ., Livermore. Lawrence Livermore Lab.

DETAILED MODELS OF HYDROCARBON COMBUSTION

Frederick L. Dryer (Princeton Univ.) and Charles K. Westbrook Mar. 1978 18 p Presented at Workshop on Modeling of Combust. in Practical Systems, Los Angeles, 4-6 Jan. 1978

(Contract W-7405-eng-48)

(UCRL-80896; Conf-780137-1) Avail: NTIS HC A02/MF A01

Important aspects which must be considered in constructing chemical kinetics submodels for numerical predictions of the properties of practical combustion system operation are examined. Factors to be considered include the selection of all of the relevant chemical species and the reactions between them. Reaction rates must be specified over the range of temperature, pressure, and composition being studied. This type of information is known in detail for only a small number of simple fuel molecules; for all other fuels most of the mechanistic information is still unknown. In models where a detailed mechanism is known, failure to include species and reactions will usually produce significant errors in computed results. This point was demonstrated using results of two CO oxidation models (with and without HO2 chemistry). Two major factors exist which can limit the choice of reaction mechanism. The fuel and intermediate species may be complex molecules, reacting through a very large number of unknown paths with undetermined rates. ERA

N78-33178# Ames Lab., Iowa.

SEPARATION OF METAL IONS USING AN o-HYDROXY-PROPIOPHENOXIME RESIN M.S. Thesis

J. N. King Dec. 1977 67 p refs

(Contract W-7405-eng-82)

(IS-T-801) Avail: NTIS HC A04/MF A01

A chelating ion-exchange resin incorporating an ohydroxy-propiophenoxime functional group onto an XAD-4 polymer matrix was synthesized and used for the separation and quantitative determination of both copper and molybdenum by high-speed liquid chromatography. Iron, uranium, citrate, and fluoride were found to interfere in the determination of copper. Of the ions tested, none was found to interfere with the determination of molybdenum. Several NBS Standard samples were successfully analyzed for copper and molybdenum. The new method is both accurate and fast. Most samples can be analyzed in less than ten minutes. Bis(2-hydroxyethyl) dithiocarbamate was shown to be superior to PAR as a color-forming reagent for the continuous spectrophotometric detection of copper. Thiolactic acid was shown to be adaptable to the continuous spectrophotometric detection of molybdenum. Both dyes gave linear responses when peak height was plotted against micrograms of metal. ERA

N78-33179# Ames Lab., Iowa.

FORCED-FLOW CHROMATOGRAPHIC DETERMINATION OF CALCIUM AND MAGNESIUM WITH CONTINUOUS SPECTROPHOTOMETRIC DETECTION Ph.D. Thesis

M. D. Arguello Dec. 1977 118 p refs

(Contract W-7405-eng-82)

(IS-T-806) Avail: NTIS HC A06/MF A01

Modifications to the forced-flow chromatograph include a flow-through pH monitor to continuously monitor the pH of the final effluent and an active low pass filter to eliminate noise in the spectrophotometric detector. All separations are performed using partially sulfonated XAD-2 as the ion exchanger. Elution of calcium and magnesium is accomplished using ammonium chloride and ethylenediammonium chloride solutions. Calcium and magnesium are detected by means of Arsenazo I and PAR-ZnEDTA color-forming reagents. Other metal ions were detected by means of PAR and Chromazurol S color-forming reagents. Calcium and magnesium distribution coefficients on partially sulfonated XAD-2 as functions of ammonium chloride and ethylenediammonium chloride concentration were given together with distribution coefficients of other metal ions. ERA

N78-33180# Hanford Engineering Development Lab., Richland, Wash.

LITHIUM LITERATURE REVIEW: LITHIUM'S PROPERTIES AND INTERACTIONS

D. W. Jeppson, J. L. Ballif, W. W. Yuan, and B. E. Chou Apr. 1978 109 p refs

(Contract EY-76-C-14-2170)

(HEDL-TME-78-15) Avail: NTIS HC A06/MF A01

Lithium literature was reviewed to provide a better understanding of the effects of lithium spills that might occur in magnetic fusion energy (MFE) facilities. Lithium may be used as a breeding blanket and reactor coolant in these facilities. Physical and chemical properties of lithium as well as the chemical interactions of lithium with various gases, metals and nonmetals were identified. A preliminary assessment of lithium concrete reactions was completed using differential thermal analysis. ERA

N78-33181# California Univ., Berkeley. Lawrence Berkeley Lab.

COMPUTATIONAL STUDY OF PHYSICAL AND CHEMICAL FLAME INHIBITION

Nancy J. Brown and R. W. Schefer Apr. 1978 39 p refs Presented at Western States Sec./Combustion Inst., Boulder, Colo., 17 Apr. 1978

(Contract W-7405-eng-48)

(LBL-6899; Conf-780417-5) Avail: NTIS HC A03/MF A01

A set of modeling studies that were undertaken to acquire a more detailed knowledge of combustion inhibition mechanisms are reported. H2/O2/Ar mixtures reacting in the idealized perfectly stirred reactor were investigated. Three H2/O2 kinetic mechanisms were considered, differing from one another by the number of HO2 reactions included. Two physical inhibitors, Ar and N2, and one chemical inhibitor, HBr, were investigated. Additional parameters considered were pressure, equivalence ratio, inhibitor concentration and rate coefficient variation. HBr was the most effective inhibitor and acted chemically in that it caused substantial reduction in radical concentrations in the mixtures considered. Ar and N2 acted as physical diluents with N2 the more effective of the two due to its larger heat capacity. ERA

N78-33182# Missouri Water Resources Center, Rolla.

MEASUREMENT OF ABSORPTION COEFFICIENTS OF WATER IN THE VISIBLE SPECTRAL REGION, PHASE 1 AND 2

Richard C. Waring, Marvin R. Querry, Philip G. Cary, and Ray Jordan 27 Jan. 1978 136 p refs

(Contracts DI-14-34-0001-7053; DI-14-34-0001-7054)

(PB-281500/9; W78-07052; OWRT-A-091-MO(3)) Copyright. Avail: NTIS HC A07/MF A01 CSCL 07D

The attenuation coefficient of deionized filtered water was measured in the wavelength regions 418-640 nm and 660-

695 nm. A tunable dye laser provided a source of quasimonochromatic electromagnetic radiation. The data were collected by use of a split laser beam, a reference and sample cell, detector, dual channel boxcar integrator, A-D converter and 9820 Hewlett-Packard calculator. Rayleigh scattering coefficients for local density fluctuations within the liquid were computed in the region 418-640 nm attenuation coefficient, thus providing the sum of the absorption coefficient and the scattering coefficients caused by microscopic particles suspended in the liquid. GRA

N78-33183# Council for Scientific and Industrial Research, Pretoria (South Africa). Chemical Engineering Research Group.
MEASUREMENT OF THE THERMAL CONDUCTIVITY OF LIQUIDS
D. G. Rogers May 1978 23 p refs
(PB-281706/2; CSIR-CENG-243; ISBN-0-7988-1331-8) Avail: NTIS HC A02/MF A01 CSCL 07D

Liquid phase thermal conductivities were measured by a relative method using a vertical coaxial cylinder cell. With calibration, errors in calculated values were less than 5 percent. The method is recommended for determining the thermal conductivities of mixtures or products in the industry. Instructions for using the cell unit are given. GRA

N78-33184# Georgia Inst. of Tech., Atlanta. School of Mechanical Engineering.
EFFECTS OF IGNITION SOURCES AND FIRE RETARDANTS ON MATERIAL IGNITION Final Report, Jan. 1977 - Mar. 1978
P. Durbetaki, W. C. Tincher, H. Chang, C. C. Ndubizu, and M. L. Teague 31 Mar. 1978 230 p refs
(Grant NBS-G7-9003)
(PB-281451/5; NBS-GCR-78-126) Avail: NTIS HC A11/MF A01 CSCL 11E

The fire loss probability is composed of all subprobabilities which are associated with the events and processes leading to the occurrence of the fire loss. The events and processes generally fall into two categories, the selection processes and the physico-chemical processes. Measurements were carried out to provide required data on thermophysical properties, constitutive description of processes, and ignition times. Description of the preignition processes and the prediction of ignition time was formulated. Thermal radiative properties, thermal conductance, and ignition frequency measurements were also carried out.GRA

N78-33185# National Technical Information Service, Springfield, Va.
X RAY FLUORESCENCE ANALYSIS, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1975 - Jul. 1978
Diane M. Cavagnaro Aug. 1978 155 p Supersedes NTIS/PS-77/0739; NTIS/PS-76/0678; NTIS/PS-75/584
(NTIS/PS-78/0722/5; NTIS/PS-77/0739; NTIS/PS-76/0678; NTIS/PS-75/584) Avail: NTIS HC $28.00/MF $28.00 CSCL 07D

Techniques, apparatus, equipment design, and applications of X ray fluorescence analysis are cited. The bibliography includes references on the theory, excitation sources and detectors, and data reduction and analysis. This updated bibliography contains 148 abstracts, 41 of which are new entries to the previous edition. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N78-33186 California Univ., Berkeley.
KINETICS OF IRON ORE REDUCTION Ph.D. Thesis
Chun-Hao Koo 1977 100 p
Avail: Univ. Microfilms Order No. 7812640

A mathematical formulation, which based on the grain model, was developed for three step reduction of iron ore. Venezuelan iron ore particles reduced by hydrogen in a laboratory fluidized bed reactor and their reduction rates were determined. The experimental results indicate that under the conditions of the experiments the chemical step, rather than pore diffusion, controls the progress of reaction. The ores and the reduced iron was characterized by scanning electron microscopy, mercury penetration porosimetry and BET surface area measurement. The results reveal that the reducibility of the ore depends more on the pore's size than the surface area and the porosity. The impurities may also influence the reduction. The conclusion was reached that the physical structure of a porous ore did have important relationship with the kinetic behavior; especially, the pore size. Dissert. Abstr.

N78-33187 California Univ., Los Angeles.
TRANSIENT AND FAILURE ANALYSES OF POROUS ZINC ELECTRODES Ph.D. Thesis
Won Guen Sunu 1978 179 p
Avail: Univ. Microfilms Order No. 78-13955

A one dimensional mathematical model, perpendicular to the electrode surface, of a porous zinc electrode was developed on the basis of concentrated ternary electrolyte theory. Numerical techniques were used to predict the galvanostatic behavior and thus the failure mechanisms of porous zinc electrodes under conditions similar to those of secondary zinc batteries. Profiles of zinc and oxide and electrode overpotentials during galvanostatic operation of pressed zinc electrodes having two different porosities were measured at superficial current densities of 20 and 50 mA/sq cm. A membrane was used to separate the zinc test and counter electrode compartments. The experimental observations are in good agreement with the theoretical predictions. Dissert. Abstr.

N78-33188 Stanford Univ., Calif.
STRAIN ENHANCED SPHEROIDIZATION AND SUPERPLASTIC FLOW IN A LEAD-TIN EUTECTIC ALLOY, PART A. DEVELOPMENT OF A PHENOMENOLOGICAL EQUATION FOR SUPERPLASTIC FLOW OF FINE GRAINED MATERIALS, PART B Ph.D. Thesis
Richard Allen White 1978 202 p
Avail: Univ. Microfilms Order No. 7814220

The stress-strain behavior of as-cast specimens of lead-tin eutectic alloy was examined as transformation occurs from a lamellar structure to a spheroidized one during plastic deformation. The apparent activation energy for the spheroidization process occurring below 60 C was found to be 60 kjoule/mole, which is in the order of grain boundary diffusion. Above 60 C, the apparent activation energy was 87 kjoule, which is in the order of lattice diffusion. A model of strain enhanced spheroidization was developed. The superplastic behavior of the alloy was studied to determine if there was a change from grain boundary diffusion controlled flow to lattice diffusion controlled flow with increasing temperature. The fine structure superplasticity of 56 fine grained materials was examined to determine the temperature and creep rate dependence for superplastic flow. Dissert. Abstr.

N78-33189 George Washington Univ., Washington, D. C.
EFFECT OF MICROSTRUCTURE ON FATIGUE PROPERTIES OF Ti-6Al-4V Ph.D. Thesis
Mohammed Ashraf Iman 1978 161 p
Avail: Univ. Microfilms Order No. 78-15802

The effect of thermal treatment on microstructure and fatigue properties of the alloy Ti-6Al-4V was investigated. The properties were evaluated after annealing, after quenching from different thermal treatment temperatures, and also after aging. Fatigue lives were determined under fixed load, as well as fixed displacement cycling. Microstructure and fracture surfaces were studied using an optical microscope, a scanning electron microscope, and a transmission electron microscope. Compositions of phases were determined by electron microprobe analysis. X-ray diffraction patterns and selected area electron diffraction patterns were taken to identify the phases present and to determine the lattice parameters of the phases. Dissert. Abstr.

N78-33190 Pennsylvania Univ., Philadelphia.
HIGH TEMPERATURE CYCLIC DEFORMATION IN NICKEL TD-NICKEL, AND Al-4 PERCENT Cu ALLOY AGED TO CONTAIN THETA PRIME AND THETA DOUBLE PRIME Ph.D. Thesis
Shrikant Parameshwar Bhat 1978 454 p

Avail: Univ. Microfilms Order No. 7816280

The basic aspects of cyclic deformation at high temperatures are explored as a function of certain microstructural variables. Four simple materials were selected for detailed study: (1) commercially pure nickel, (2) oxide dispersion-hardened alloy (TD-nickel), (3) Al-4%Cu alloy aged to contain theta prime precipitates, and (4) Al-4%Cu alloy aged to contain theta double prime precipitates. The range of temperatures investigated is from room temperature up to 2/3 of the homologous melting temperature; in the precipitation hardened materials the highest testing temperature is limited to their ageing temperatures. The strain amplitudes selected result in lives of less than 10,000 cycles. For comparison purposes UTS values were measured as a function of temperature. Detailed microstructural observations were carried out by transmission and scanning electron microscopy to help interpret the mechanical property measurements. Dissert. Abstr.

N78-33191 Georgia Inst. of Tech., Atlanta.

LOW CYCLE CORROSION FATIGUE AND CORROSION FATIGUE CRACK PROPAGATION OF HIGH STRENGTH 7000-TYPE ALUMINUM ALLOYS Ph.D. Thesis

Fu-shiong Lin 1978 173 p

Avail: Univ. Microfilms Order No. 7816446

Four Al-6Zn-2Mg-xCu alloys with almost identical microstructures were chosen to investigate the effect of copper content on the low cycle corrosion fatigue and corrosion fatigue crack propagation behavior. Nominal copper contents were 0.01, 1.0, 1.6 and 2.1 percent Cu. Three different environments were employed: dry air, distilled water and a 3.5 percent NaCl solution. Each alloy, processed to produce two different degrees of recrystallization (DR), was chosen for studying the effect of DR on the low cycle corrosion fatigue and corrosion fatigue propagation in these environments. Dissert. Abstr.

N78-33192 California Univ., Davis.

MEASURING AND PREDICTING THE DYNAMIC EFFECTS OF A CONFINED THIN METAL PLATE PULSE HEATED INTO THE LIQUID-VAPOR REGIME Ph.D. Thesis

Richard Charles Baxter 1978 190 p

Avail: Univ. Microfilms Order No. 7815493

The dynamic response of a confined thin layer of lead heated rapidly and uniformly to a supercritical state was investigated. Lead targets 0.025 mm and 0.05 mm thick were contained between a thin titanium tamping layer and a thick layer of fused quartz with several different gap widths between the lead and the confining surfaces. After being heated by an electron beam for about 50 nanoseconds, lead specimens expanded to a state of approximately half liquid and half vapor. Measurements of the stress in the quartz and the velocity of the tamper produced by the expanding lead were compared with one dimensional hydrodynamic computer program predictions. Measured and predicted peak stresses in the quartz for no gaps were approximately 12 kilobars and agreed within one kilobar. Peak stresses decreased rapidly with gap size to values, at 0.02 mm gaps, of about one kilobar for the 0.025 mm lead targets and five kilobars for the 0.05 mm targets. Dissert. Abstr.

N78-33193 Rice Univ., Houston, Tex.

A MODEL CALCULATION FOR THE INTERACTION OF HYDROGEN WITH TRANSITION METALS: H IN Ni Ph.D. Thesis

Milton Samuel Shaw 1978 92 p

Avail: Univ. Microfilms Order No. 7814800

The metal band structure was treated as two noninteracting bands interpolated from band structure calculations. The s-band screening of the proton was calculated from the radial Schrodinger equation using the Numerov algorithm. The d-band was approximated by a single tight-binding band where the atomic d-functions are spherically averaged. The effective hydrogen potential was determined using an approximate potential for the s-band screening. The d-band screening was calculated self-consistently taking the s-band screening as given. The screening was dependent on the position of the hydrogen. The energy of the hydrogen as a function of position was calculated using the density functional formalism. In Ni the octahedral site energy was found to be 2.83 eV lower than that at the tetrahedral site. Dissert. Abstr.

N78-33194*# Texas Univ. at El Paso.

SIZE EFFECTS AND ELECTRON MICROSCOPY OF THIN METAL FILMS M.S. Thesis

Jose David Hernandez Aug. 1978 82 p refs

(Grant NsG-3146)

(NASA-CR-157746) Avail: NTIS HC A05/MF A01 CSCL 11F

All films were deposited by resistive heated evaporation in an oil diffusion pumped vacuum system (ultimate approx. equal to 0.0000001 torr). The growth from nuclei to a continuous film is highly dependent on the deposition parameters, evaporation rate as well as substrate material and substrate temperature. The growth stages of a film and the dependence of grain size on various deposition and annealing parameters are shown. Resistivity measurements were taken on thin films to observe size effects. G.Y.

N78-33195*# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.

EARLY STAGES OF THE OXIDATION OF METAL SURFACES Final Report, Oct. 1976 - 30 Sep. 1978

H. C. Gatos and K. H. Johnson 30 Sep. 1978 100 p

(Grant NsG-1337)

(NASA-CR-157767) Avail: NTIS HC A05/MF A01 CSCL 11F

Photoemission cross sections were calculated for the ZnO4(-6) cluster using the self consistent-chi alpha- scattered wave theory to display the main features of the ultraviolet and X-ray photoemission data from ZnO. A solid model is suggested for an absolute photoemission intensity comparison resulting in chi alpha intensities which are roughly 70% of the experimental values. Together with the experimental data, the calculations allow a complete determination of the electronic structure of a ZnO surface. A.R.H.

N78-33196*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

LONG-TERM HOT-HARDNESS CHARACTERISTICS OF FIVE THROUGH-HARDENED BEARING STEELS

Neil E. Anderson Oct. 1978 20 p refs Prepared in cooperation with US Army Aviation Research and Development Command, St. Louis, Mo.

(NASA-TP-1341; E-9533) Avail: NTIS HC A02/MF A01 CSCL 11F

Five vacuum-melted bearing steels tempered to various room temperature hardnesses: AISI 52100 and the tool steels AISI M-1, AISI M-50, Halmo, and WB-49 were studied. Hardness measurements were taken on AISI 52100 at room temperature and at elevated temperatures after soaking it at temperatures to 478 K (400 F) for as long as 1000 hours. Hardness measurements were also taken on the tool steels after soaking them at temperatures to 700 K (800 F) for as long at 1000 hours. None of the tool steel tempered during soaking and AISI 52100 did not temper when soaked at 366 K (200 F) for 1000 hours. However, AISI 52100 that was initially hardened to room temperature hardness of 62.5 or 64.5 lost hardness during the first 500 hours of the 1000-hour soak tests at temperatures greater than 394 K (250 F), but it maintained its hardness during the final 500 hours of soaking. Similarly, AISI 52100 initially hardened to room temperature hardness of 60.5 lost hardness during the first 500 hours of the 1000-hour soaking at temperatures greater than 422 K (300 F), but it maintained its hardness during the final 500 hours of soaking. A.R.H.

N78-33197# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

GALVANIC CORROSION FATIGUE TESTING OF 7075-T6 ALUMINUM BONDED WITH GRAPHITE-EPOXY COMPOSITE

S. R. Brown and J. J. DeLuccia 10 Jan. 1978 18 p refs

(ZF54590001)

(AD-A055714; NADC-77328-60) Avail: NTIS HC A02/MF A01 CSCL 11/6

Galvanic corrosion effects were determined on 7075-T6 aluminum with attached, adhesively bonded sections of graphite-epoxy composite material. Fatigue tests were conducted on specimens exposed to a sulfur dioxide-salt spray environment in a chamber constructed on a Krouse direct-stress fatigue machine.

S-N curves were developed under tension-tension conditions (R = 0.1) and with unprotected specimens, a 20 percent reduction in fatigue life was attributed to the contacting graphite-epoxy composite material. Protective coatings and nonconductive barriers to break the galvanic corrosion circuit were evaluated under the same corrosion fatigue (tension-tension) test conditions. Epoxy primer-polyurethane paint systems, polysulfide sealants and glass cloth barriers were used to measure their effectiveness in galvanic corrosion control. Metallograph and SEM (Scanning Electron Microscope) observations were made of corrosion sites and fatigue surfaces. Author (GRA)

N78-33198# Connecticut Univ., Storrs.
ELECTRONIC STRUCTURE OF TERNARY ALLOYS Final Report, 1 Jun. 1975 - 31 May 1978
Leonid V. Azaroff 1 Jun. 1978 18 p refs
(Grant DAAG29-77-G-0161)
(AD-A056356; ARO-12454 2-MS) Avail: NTIS HC A02/MF A01 CSCL 11/6

The X-ray K and L absorption spectra of Fe and Ni in a series of ternary Fe-Ni-Al alloys were measured for different Fe-Ni ratios and Al concentrations ranging up to 10at.% in the nickel-rich fcc region and up to 25at.7.% in the iron-rich bcc region. For all compositions examined, absorption spectra properly corrected for the X-ray thickness effect failed to disclose any variations attributable to changes in the local densities of unfilled 3d states. Theoretical band calculations were carried out for several fcc random solid solutions using the average t-matrix approximation. The alloy density-of-state curves showed distinct peaks corresponding to the d states at Fe and Ni atom sites, respectively. These peaks did not change either with Fe-Ni ratio or with Al additions except to reflect atomic concentrations and a slight broadening attributable to increased disordering caused by aluminum. Although attempted, actual X-ray spectra could not be calculated because the requisite component densities contained nonphysical negative density values. The agreement between the two kinds of X-ray measurements and the band calculations that the local densities of 3d holes do not change either at Fe or at Ni sites requires a new model to explain the observed magnetic saturation effects in these alloys. GRA

N78-33199# Naval Surface Weapons Center, White Oak, Md.
FEASIBILITY OF ULTRASONIC RAYLEIGH WAVES FOR THE DETECTION OF CORROSION BENEATH PAINT Final Report
Robert A. Youshaw 7 Feb. 1978 28 p refs
(AD-A056643; NSWC/WOL/TR-78-39) Avail: NTIS HC A03/MF A01 CSCL 14/2

Rayleigh waves of ultrasonic frequency were investigated as a potential tool for detecting corrosion beneath paint on Naval ships. In certain cases, the method did detect corrosion, but in other cases known pockets of corrosion could not be detected at all. Most important, it was found that the paint is extremely attenuating to Rayleigh waves and that inspection distance is effectively limited to a distancd of about twelve inches. For these reasons Rayleigh waves were not considered either practical or reliable as a tool for detecting corrosion beneath paint. Author (GRA)

N78-33200# Battelle Columbus Labs., Ohio.
COMPUTER-AIDED DESIGN AND MANUFACTURING FOR EXTRUSION OF ALUMINUM, TITANIUM AND STEEL STRUCTURAL PARTS. PHASE 2: APPLICATION TO PRACTICAL EXTRUSIONS. VOLUME 1: DESCRIPTION OF CAD/CAM SYSTEMS FOR EXTRUSION OF STRUCTURAL SHAPES Final Report, 19 Jul. 1976 - 18 Oct. 1977
Vijay Nagpal, Carl F. Billhardt, and Taylan Altan Jan. 1978 119 p refs 2 Vol.
(Contract DAAG46-75-C-0054)
(AD-A056965; USAAVRADCOM-TR-78-29-Vol-1; AMMRC-TR-78-26-Vol-1) Avail: NTIS HC A06/MF A01 CSCL 13/8

The overall objective of this program was to develop practical computer-aided design and manufacturing (CAD/CAM) techniques for extrusion of aluminum alloys, steels, and titanium alloys. This program was conducted in two phases. This report covers the Phase-II work, which was completed by performing the following major tasks: (1) assemble geometric modules to represent practical extrusion shapes, (2) apply the CAD/CAM method to a streamlined die, (3) develop a CAD/CAM system for non-lubricated extrusion through flat-face dies, (4) conduct extrusion trials and evaluate CAD/CAM extrusion. In order to enhance readability, the results of Phase-II work are presented in the form of two volumes. Volume I includes the following chapters: (1) CAD/CAM of Streamlined Dies for Lubricated Extrusion of 'T' Sections, (2) CAD/CAM of Flat-Face Dies for Nonlubricated Extrusion of Aluminum Structural Shapes, and (3) Extrusion of 'T' Sections of Aluminum, Titanium and Steel using computer-aided techniques. Volume II is the Instruction Manual and describes the content and use of computer programs. Author (GRA)

N78-33201# Battelle Columbus Labs., Ohio.
COMPUTER-AIDED DESIGN AND MANUFACTURING FOR EXTRUSION OF ALUMINUM, TITANIUM AND STEEL STRUCTURAL PARTS. PHASE 2: APPLICATION TO PRACTICAL EXTRUSIONS. VOLUME 2: USER'S MANUAL FOR ALEXTR SYSTEM OF COMPUTER PROGRAMS FOR DESIGN AND MANUFACTURE OF FLAT-FACE DIES FOR ALUMINUM EXTRUSION Final Report, 19 Jul. 1976 - 18 Oct. 1977
Carl F. Billhardt, Vijay Nagpal, and Taylan Altan Jan. 1978 227 p refs 2 Vol.
(Contract DAAG46-75-C-0054)
(AD-A056966; USAAVRADCOM-TR-78-29-Vol-2; AMMRC-TR-78-26-Vol-2) Avail: NTIS HC A12/MF A01 CSCL 13/8

The overall objective of this program was to develop practical computer-aided design and manufacturing (CAD/CAM) techniques for extrusion of aluminum alloys, steels and titanium alloys. Phase II results can be summarized as follows: The computer-aided manufacturing and NC techniques developed in Phase I were extended to make 'SHAPE' computer system applicable to extrusion of structural shapes, such as L's and T's. ALEXTR computer system for nonlubricated extrusion of aluminum alloys was developed. An economical-technical evaluation of the usefulness of CAD/CAM system in extrusion was performed. This study showed that utilization of CAD/CAM systems developed in this program can reduce manufacturing costs, improve delivery schedules, and increase the productivity of extrusion operations. GRA

N78-33202# Maryland Univ., College Park. Dept. of Physics and Astronomy.
NEAREST NEIGHBOR SPACINGS OF CLEAN VANADIUM SURFACES FROM EXTENDED APPEARANCE POTENTIAL FINE STRUCTURE
W. T. Elam, P. I. Cohen, L. Roelofs, and Robert L. Park 1 Jun. 1978 8 p refs
(Contracts N00014-75-C-0292; N00014-77-C-0485)
(AD-A057142) Avail: NTIS HC A02/MF A01 CSCL 07/2

Fine structure in the excitation probability of the 2p core state of vanadium by electron bombardment has been found to extend for several hundred volts above the appearance potential threshold. The structure results from interference of an outgoing spherical wave of a scattered electron with backscattered components from neighboring atoms. It is therefore analogous to extended X-ray absorption fine structure (EXAFS) and it should be possible to extract geometric information using the same Fourier inversion techniques. The short mean free path for inelastic scattering of the incident electrons, however, renders the technique sensitive to the structure in just the outermost layers of the material. GRA

N78-33203# Maryland Univ., College Park. Dept. of Physics and Astronomy.
EXTENDED FINE STRUCTURE ABOVE VANADIUM L-SHELL APPEARANCE POTENTIAL THRESHOLDS
P. I. Cohen, T. L. Einstein, W. T. Elam, Y. Fukuda, and Robert L. Park Mar. 1978 21 p refs Submitted for publication
(Contracts N00014-75-C-0292; N00014-77-C-0485)
(AD-A057141) Avail: NTIS HC A02/MF A01 CSCL 07/2

The probability of electron scattering from atomic core states as a function of electron energy, can be extracted from secondary electron yields by differentiation. Fine structure variations above

the thresholds for excitation of the vanadium 2p and 2s states are found to extend for several hundred electron volts. The fine structure is altered significantly by reaction of the surface with CO, but is insensitive to long-range order. The structure exhibits periodicities in k, and presumably results from interference of an outgoing spherical wave of a scattered electron with backscattered components from neighboring atoms. The structure therefore appears to be analogous to extended X-ray absorption fine structure (EXAFS). Attempts to extract interatomic spacings by Fourier inversion, however, have been frustrated by multiple scattering effects and other complications. The extreme experimental simplicity provides ample motivation for dealing with these theoretical complexities. Author (GRA)

N78-33204# Illinois Univ. at Urbana-Champaign, Urbana.
MACHINE CASTING OF FERROUS ALLOYS Final Report, 1 Oct. 1975 - 31 Dec. 1977
R. Mehrabian, D. G. Backman, G. J. Abbaschian, C. Y. Chen, S. Hong, S. D. E. Gramati, and Y. V. Murty May 1978 70 p refs
(Contract DAAG46-76-C-0023; ARPA Order 2267)
(AD-A056824; AMMRC-TR-78-23) Avail: NTIS HC A04/MF A01 CSCL 11/6

The initial aim of the overall program was to plan and test new and innovative processes and develop a machine casting system for ferrous alloys that would produce good quality parts economically and at high speed. Emphasis of the work at the University of Illinois was on processes and casting systems which employ a partially solid alloy as charge material. The program was especially designed to establish the processing conditions necessary to produce porosity-free parts and to evaluate the Rheocasting and Thixocasting processes from both a technical and economical point of view. Analytical and computer models were developed for solutionizing of Rheocast and conventional cast (dendritic) alloys. The predictions were compared with experiment on a model alloy system, 2024 aluminum base alloy. Recent results of die life studies obtained from M.I.T. were incorporated in the cost analysis model developed earlier and a cost per piece for a previously investment cast part was calculated for manufacture via the new machine casting process. This final report summarizes earlier results reported in the first eighteen months of the program and covers the details of the last 12 months. GRA

N78-33205# Atomics International Div., Golden, Colo. General Metallurgy Group.
INTERACTION OF XENON LIGHT WITH THE SURFACE OF 304 STAINLESS STEEL
R. W. Krenzer 14 Feb. 1978 24 p refs
(Contract EY-76-C-04-3533)
(RFP-2647) Avail: NTIS HC A02/MF A01

Laser amplifier frames fabricated from type 304 stainless steel are known to cause damage to glass lenses by ejecting particles which are deposited on the lenses. High energy pulses of xenon light interact with the steel surface to produce damage sites. Heat treatment and surface cleaning procedures greatly affect the surface stability of the steel and influence contamination generated by the steel. It is believed that inclusions and/or carbides play a role, and the size of damage sites observed on glass correlate with the size of nonmetallic phases in the steel. Thermal etching of the steel was found to be a principle mechanism of surface damage caused by the high energy xenon light. ERA

N78-33206# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
THERMODYNAMICS OF CARBON IN NICKEL-BASED MULTICOMPONENT SOLID SOLUTIONS Ph.D. Thesis
D. J. Bradley Apr. 1978 250 p refs
(Contract W-7405-eng-26)
(ORNL/TM-6282) Avail: NTIS HC A11/MF A01

The activity coefficient of carbon in nickel, nickel-titanium, nickel-titanium-chromium, nickel-titanium-molybdenum and nickel-titanium-molybdenum-chromium alloys was measured at 900, 1100 and 1215 C. The results indicate that carbon obeys Henry's Law over the range studied (0 to 2 at. percent). The literature for the nickel-carbon and iron-carbon systems are reviewed and corrected. For the activity of carbon in iron as a function of composition, a new relationship based on re-evaluation of the thermodynamics of the CO/CO2 equilibrium is proposed. Calculations using this relationship reproduce the data to within 2.5 percent, but the accuracy of the calibrating standards used by many investigators to analyze for carbon is at best 5 percent. ERA

N78-33207*# National Academy of Sciences - National Research Council, Washington, D. C. National Materials Advisory Board.
CONTINGENCY PLANS FOR CHROMIUM UTILIZATION. PUBLICATION NMAB-335
1978 374 p refs Sponsored in cooperation with NASA and US Bureau of Mines
(Contracts EY-76-C-02-2746; GS-OO-DS-(P)-94008)
(NASA-CR-157789; COO-2746-1; LC-77-95193;
ISBN-0-309-02737-3) Avail: NTIS HC A16/MF A01 CSCL 11F

The United States depends entirely on foreign sources for the critical material, chromium, making it very vulnerable to supply disruptions. The effectiveness of programs such as stockpiling, conservation, and research and development for substitutes to reduce the impact of disruption of imports of chromite and ferrochromium are discussed. Alternatives for decreasing chromium consumption also are identified for chromium-containing materials in the areas of design, processing, and substitution. ERA

N78-33208# Oak Ridge National Lab., Tenn. Engineering Technology Div.
HEAVY-SECTION STEEL TECHNOLOGY PROGRAM Quarterly Progress Report, Jul. - Sep. 1977
G. P. Whitman and R. H. Bryan Apr. 1978 131 p refs
(Contract W-7405-eng-26)
(ORNL/NUREG/TM-166) Avail: NTIS HC A07/MF A01

The heavy-section steel technology program comprises studies related to all areas of the technology of the materials fabricated into thick section, primary coolant systems of light-water-cooled nuclear power reactors. The principal area of investigation is the behavior and structural integrity of steel pressure vessels containing cracklike flaws. Current work is organized into seven tasks: program administration and procurement, fracture mechanics analyses and investigations, effect of high-temperature primary reactor water on subcritical crack growth, investigations of irradiated materials, pressure vessel investigations, thermal shock investigations, and foreign research. Stress intensity factors measured on photoelastic models of BWR vessels and intermediate test vessels (ITVs) with nozzles are consistent with values deduced from burst tests of the ITVs. The ITV models reproduced effects locally present in the BWR nozzles with a safety margin of 20 to 50%. ERA

N78-33209# Sandia Labs., Albuquerque, N. Mex.
METAL DEFORMATION MODELING: STRESS RELAXATION OF ALUMINUM
R. W. Rohde and J. C. Swearengen 1978 24 p refs Presented at Kansas City, Mo., May 1978
(Contract EY-76-C-04-0789)
(SAND-78-0164C; Conf-780515-1) Avail: NTIS HC A02/MF A01

Experiments designed to test the validity of a model for rate dependent inelastic deformation in metals are presented and discussed. The stress dependence of the strain rate in 99.99 percent pure aluminum was determined at 308K from stress relaxation and creep experiments, and at 373K from stress relaxation experiments. Deformation history was examined by conducting experiments subsequent to either monotonic tensile or reversed strain cyclic loading. At both temperatures and for both deformation histories evidence of microstructural recovery was identified during the course of a relaxation experiment. The exponent characterizing recovery was found to be 20 at 300K for both stress relaxation and creep, indicating that plastic deformation during creep and relaxation may be governed by the same kinetic law. The model is also found to predict correctly transient behavior observed in some relaxation experiments. ERA

N78-33210# General Electric Co., Schenectady, N. Y. Energy Systems Programs Dept.
HOT CORROSION/EROSION TESTING OF MATERIALS FOR APPLICATIONS FOR ADVANCED POWER CONVERSION

SYSTEMS USING COAL-DERIVED FUELS. TASK 2. EVALUATION OF TURBINE MATERIALS FOR USE IN A COAL-FIRED FLUIDIZED BED COMBUSTION ENVIRONMENT Progress Report, Feb. 1978
R. L. McCarron Mar. 1978 21 p
(Contract EX-76-C-01-2326)
(FE-2326-20; PR-20) Avail: NTIS HC A02/MF A01

Activities are reported in a program to provide 1000-hour engineering data on the corrosion/erosion deterioration of gas turbine materials U 700 and IN-738 exposed to the exhaust gas from a pressurized fluidized bed combustor. The results show that on the leading edges of the specimens there was deposition, corrosion, and erosion all occurring in the same area. It is reasonable to expect that corrosion and erosion might occur simultaneously. The occurrence of erosion and deposition in the same area is unlikely except if there was a significant change in the gas velocity during the test. This was the case for the 100 hour shakedown test since the mass flow through the turbine test section decreased significantly after the first 50 hours due to plugging of the inlet orifice of the turbine test section upstream of the cascades. ERA

N78-33211# Aluminum Co. of America, Alcoa Center, Pa. ALCOA Labs.
CATALOG INFORMATION ON THE PERFORMANCE OF ALUMINUM IN SEA WATER
R. H. Wagner and R. A. Bonewitz 5 Apr. 1978 193 p refs
(Contract EY-76-C-06-1830)
(PNL-2606) Avail: NTIS HC A09/MF A01

To help evaluate aluminum alloys for ocean thermal energy conversion (OTEC), heat exchanger tubes data on the performance of aluminum in surface and deep sea water was assembled and computer cataloged. Pitting and crevice corrosion proved to be the types of attack that predominated. The cataloged data are the results of many static tests conducted under natural conditions of marine fouling; hence, they must be used carefully in qualifying aluminum for OTEC purposes. These data can serve the OTEC program best as a basis for selecting aluminum alloys that appear promising as candidates for further evaluation. The aluminum alloys 5052 and Alclad (7072) 3003 fall into this category. Available service histories also proved inadequate for qualifying aluminum alloys for the OTEC application, but they do support the selection of Alclad (7072) 3003 as a tubing alloy worthy of further consideration. Performance data covering areas of investigation peculiar to OTEC power plants is needed to permit a firm decision for or against aluminum alloy tubes. ERA

N78-33212# California Univ., Livermore. Lawrence Livermore Lab.
HIGH TEMPERATURE, NONCONTACT MATERIAL TESTING
C. A. Calder and W. W. Wilcox 1977 17 p refs
(Contract W-7405-eng-48)
(UCRL-80438) Avail: NTIS HC A02/MF A01

The elastic moduli of six metals were determined at elevated temperatures by an ultrasonic method incorporating high energy laser deposition as the loading mechanism and displacement interferometry as the sensing transducer. The laser induced stress wave data from a single test provide sufficient information to evaluate any two independent moduli of an isotropic elastic material. The method permits material testing without physical contact with the specimen and is, therefore, especially convenient for high temperature work. ERA

N78-33213# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Materials Engineering.
LOCALIZED CORROSION AND STRESS CORROSION CRACKING BEHAVIOR OF AUSTENITIC STAINLESS STEEL WELDMENTS CONTAINING RETAINED FERRITE Annual Progress Report, 1 Jun. 1977 - 31 Mar. 1978
W. F. Savage and D. J. Duquette Mar. 1978 15 p
(Contract EY-76-S-02-2462)
(COO-2462-4) Avail: NTIS HC A02/MF A01

Localized corrosion (pitting) experiments were performed on single phase austenitic 304 stainless steels and on duplex 304 steels containing 6 to 8% retained delta ferrite as a result of rapid solidification (welding). Experimental variables included thermomechanical treatment, solution pH, chloride concentration and solution temperature. ERA

N78-33214# Northwestern Univ., Evanston, Ill. Dept. of Materials Science and Engineering.
INFLUENCE OF DISPERSED REFRACTORY OXIDES IN RETARDING CATALYST SINTERING Interim Report
D. Lynn Johnson Mar. 1978 47 p refs Sponsored by DOE
(EPRI-EM-624) Avail: NTIS HC A03/MF A01

A study is made of idealized sinusoidal surfaces that simulate the geometry of porous compacts and compare the results of those obtained on actual porous compact surfaces. Of particular interest is the development and confirmation of mathematical models that could predict the relationships of the various dispersoid parameters with sintering rate. These relationships were studied by measuring the rate of amplitude decay of the sinusoidal surfaces under sintering conditions. These decay rates were correlated with the porous compact sintering results and used to verify and improve the mathematical models. The results have: (1) demonstrated the effectiveness of using the sinusoidal decay rate to study nickel sintering; (2) verified the mathematical models of surface diffusion as being representative of the sintering observed on both sinusoids and porous compacts; and (3) determined that MgO and Al2O3 are more effective than CaO in retarding sintering. ERA

N78-33215# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
FORMATION OF IRON CARBONYL BETWEEN A 1/2% Mo STEEL AND HIGH-PRESSURE GASES CONTAINING CARBON MONOXIDE
H. Inouye and J. H. DeVan May 1978 27 p refs
(Contract W-7405-eng-26)
(ORNL-5410) Avail: NTIS HC A03/MF A01

An atomic absorption spectrophotometer was used to measure the formation of iron carbonyl between 1/2% Mo steel pipes and flowing high pressure gases (to 6.9 MPa) containing carbon monoxide. The net formation rate, r, of iron carbonyl was measured as a function of the velocity, temperature, and pressure of the gases to determine the conditions that prevent its formation. These variables and the gas composition affected r as follows: (1) rate r increases linearly with the gas velocity, (2) between 44 and 266 C, r increases with temperature to a sharp maximum at 177 C in a gas mixture containing 17 CO-51 H2-30 CH4-2 CO2 (vol %), (3) rate r depends on P/sub CO/ in accordance with the equation r = kP/sub CO/sub n/, where n = 4 to 5 under equilibrium conditions and n = 2 off equilibrium. The analytical procedure used to detect +-6 vpB (volume parts per billion) of iron carbonyl and +-1.5 vpB of nickel carbonyl in flowing high pressure gases is described. The reaction rates are described in terms of kinetics and thermodynamic equilibrium. ERA

N78-33216# California Univ., Berkeley. Lawrence Berkeley Lab.
DETERMINATION OF THE RECOVERY STRESSES DEVELOPED BY SHAPE MEMORY ALLOYS
H. A. Mohamed Mar. 1978 8 p refs
(Contract W-7405-eng-48)
(LBL-6884) Avail: NTIS HC A02/MF A01

A simple relationship was developed between recovery stresses, temperature, and strain, to explain the mechanical shape memory effect in some alloys which undergo thermoelastic martensitic transformation. ERA

N78-33217# Argonne National Lab., Ill. Materials Science Div.
COMPILATION OF FATIGUE DATA FOR INCOLOY 800 ALLOYS
S. Majumdar Mar. 1978 34 p refs
(Contract W-31-109-eng-38)
(ANL/MSD-78-3) Avail: NTIS HC A03/MF A01

Data were compiled for all room and elevated temperature, low cycle fatigue in Incoloy alloys 800 and 800H that were available in the literature in the United States. The compilation represented 482 data points that include strain-controlled, stress-controlled, and rotating-beam tests. ERA

N78-33218# Tennessee Univ., Knoxville. Dept. of Chemical, Metallurgical and Polymer Engineering.
STUDIES OF MICROSTRUCTURE-PROPERTY RELATIONSHIPS IN AUSTENITIC STAINLESS STEELS Final Report
J. E. Spruiell 1977 45 p refs
(Contract EY-76-S-05-4044)
(ORO-4044-7) Avail: NTIS HC A03/MF A01

A final review is presented of the research carried out to provide better understanding of elevated temperature service of austenitic stainless steels, and especially the microstructural stability of both wrought-annealed steels and welded joints. ERA

N78-33219# Oak Ridge National Lab., Tenn.
STUDY OF THE EFFECTS OF SEVERAL VARIABLES ON THE THERMAL CONDUCTIVITY OF 2 1/4 Cr-1 Mo STEEL
R. K. Williams, R. S. Graves, and J. P. Moore Apr. 1978 74 p refs
(Contract W-7405-eng-26)
(ORNL-5313) Avail: NTIS HC A04/MF A01

The thermal and electrical conductivities of nine commercial heats of 2 1/4 Cr-1 Mo heat exchanger steel were determined near room temperature. The results indicated a +-4.4 percent heat-to-heat variation of the thermal conductivity of annealed samples. Data obtained on three of the heats showed that the heat-to-heat variation decreased to +-3.1 percent at 1000 K. All of the results show that the ASME Code values for this alloy were too low. Supplementary room temperature data on aged samples show that the thermal conductivity will not change much during long term service in the 700 to 800 K range. Analysis of the electrical and thermal conductivity data showed that the results were consistent with the well established property temperature variation for pure iron. Attempts to quantitatively relate property variations to chemical and microstructural differences met with only limited success. ERA

N78-33220# Oak Ridge Gaseous Diffusion Plant, Tenn.
ELECTRODEPOSITION OF NICKEL ONTO STEEL USING A SOLUBLE MOBILE ANODE
G. S. Petit and R. R. Wright Apr. 1978 17 p refs
(Contract W-7405-eng-26)
(K-1894) Avail: NTIS HC A02/MF A01

During the cascade improvement program, a number of component parts that were in service for many years will be reused. Many of these parts will have exposed steel from loss of nickel plate or mechanical damage. A good method is needed to patch small areas of exposed steel with electroplated nickel to inhibit the corrosive attack of uranium hexafluoride (UF)6 on the steel. A method to patch bare plate steel with nickel, using a mobile soluble anode, was developed. The method and test results of coupons plated by this method are described. ERA

N78-33221# General Atomic Co., San Diego, Calif.
TEMPERATURE DEPENDENCE OF HYDROGEN SPUTTERING OF CARBON COATINGS ON PLATINUM
Joe N. Smith, Jr. and C. H. Meyer, Jr. Oct. 1977 20 p refs Presented at the 3d Conf. on Plasma Interaction in Controlled Fusion, Abingdon, Oxfordshire, England, 3 Apr. 1978 Submitted for publication
(Contract EY-76-C-03-0167-038)
(GA-A-14608; Conf-780431-3) Avail: NTIS HC A02/MF A01

The H2(+) sputtering of thin (400 to 600 A) films of C deposited on Pt was measured over the range from 20 to 850 C at an ion energy of 5 keV. The sputter yield varied from .02 atoms/ion at room temperature to a maximum value of .1 atoms/ion at 530 C. This result was compared with several previous measurements that employed bulk C targets. The differences observed were attributed largely to the effect of different experimental ion dose rates. Thus, as the dose rate increased, the maximum value of the yield decreased and the temperature at which this maximum occurs increased. This behavior is described by the model CH4 production developed by Erents et al. The relation of these results to first wall coatings in fusion energy devices is discussed. ERA

N78-33222# Notre Dame Univ., Ind.
PORE SHRINKAGE AND OSTWALD RIPENING IN METALLIC SYSTEMS Progress Report, 1 Jul. 1977 - 30 Jun. 1978
G. C. Kuczynski and C. W. Allen Feb. 1978 11 p refs
(Contract EG-77-S-02-4385)
(COO-4385-2) Avail: NTIS HC A02/MF A01

A new theory of Ostwald ripening (the coarsening of particles in a matrix or on a substrate) is being developed, which is based on the principle of minimum entropy production. This theory yields particle size distribution functions whose general shape is in much closer agreement with existing observations than is that of well established theories. Progress is reported both in the theoretical development and in several areas of experiment. The goal of the experimental program is the determination of actual distributions from very large numbers of size measurements, in order to provide statistically more significant basis for comparison with the various theories than has previously characterized such measurements. ERA

N78-33223# California Univ., Berkeley. Lawrence Berkeley Lab.
DEVELOPMENT OF NICKEL-FREE AUSTENITIC STAINLESS STEELS FOR AMBIENT AND CRYOGENIC APPLICATIONS
Glenn T. Haddick, L. D. Thompson (General Atomic Co., San Diego, Calif.), E. R. Parker, and V. F. Zackay Feb. 1978 33 p refs Presented at a Conf. on Mater. Substitution: Availability, Energy Environ. Factors, Chicago, 27 Sep. 1977
(Contract W-7405-eng-48)
(LBL-7397; Conf-7709115-1) Avail: NTIS HC A03/MF A01

A series of alloys was developed as possible replacements for some austenitic stainless steels. These alloys utilized a Mn substitution for Ni and a reduced Cr concentration from the 18% ordinarily found in the AISI 300 series stainless steels to a concentration of 13%. The base system studied was an alloy containing Fe-16% Mn-13% Cr while other elements added included small additions of N, Si, and Mo. A range of microstructures was produced from the alloying additions. The base composition had a triplex (fcc, hcp, bcc) structure while the most highly modified compositions were fully austenitic. Mechanical testing included tensile testing and Charpy V-notch testing conducted at various temperatures between -196 C to 23 C. Excellent combinations of strength and ductility were obtained (40-65 ksi yield strength, 100-125 ksi ultimate strength, 45-75% elongation and 60-80% reduction of area) at room temperature. ERA

N78-33224# Vermont Univ., Burlington.
THERMODYNAMIC AND TRANSPORT PROPERTIES OF INTERSTITIAL HYDROGEN ISOTOPES IN METAL SYSTEMS Final Report, 1 Apr. 1969 - 31 Mar. 1978
J. S. Brown 1978 19 p refs
(Contract EY-76-S-02-3551)
(COO-3551-44) Avail: NTIS HC A02/MF A01

The results of work under AEC in 1969 to its conclusion under ERDA in 1978 are discussed. The initial objectives of the research and how these objectives have changed over the period are presented. All papers and conference talks which relate to 1969 through 1978 are listed. Current endeavors are summarized and the present status of the published literature is surveyed. In addition, a number of problems that are still unresolved are identified; and some directions that future research might take on the electronic and transport properties of PdH and PdD and liquid transition metals are indicated. ERA

N78-33225# National Bureau of Standards, Boulder, Colo. Thermophysical Properties Div.
MATERIALS STUDIES FOR MAGNETIC FUSION ENERGY APPLICATIONS AT LOW TEMPERATURES, 1
F. R. Fickett and R. P. Reed Apr. 1978 367 p refs Sponsored in part by DOE
(PB-282444/9; NBSIR-78-884) Avail: NTIS HC A16/MF A01 CSCL 11F

The low temperature materials research project is summarized. The various projects are outlined and the research results are presented. An evaluation of the low temperature properties of stainless steel base metal and welds, with particular emphasis on the nitrogen strengthened stainless steels is presented. Some initial work was also done on the production and properties of nonmetallics, primarily industrial laminates, for low temperature applications. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N78-33226 Carnegie-Mellon Univ., Pittsburgh, Pa.
EFFECT OF ULTRASONIC WAVES ON THE KINETICS OF POLYMERIZATION Ph.D. Thesis
Sohan Lal Khungar 1978 155 p
Avail: Univ. Microfilms Order No. 7814384

Ultrasonic irradiation at 23 kHz was studied in bulk, solution and emulsion polymerization. The objective in bulk polymerization was to dissolve an initial 2 to 10% (by weight) polymer in a monomer and ultrasonate to generate macroradicals which would initiate polymerization without the conventional initiators. The polymer and monomer were both purified. The variables tried were power: 30 to 180 watts; temperature; 35 to 115 C; initial polymer: 0 to 10%; nitrogen purging: yes/no; agitation: yes/no; polymer/monomer systems: polybutadiene/styrene, polystyrene/styrene, poly (methylmethacrylate)/methyl methacrylate; molecular weight of polymer: 90,000-3,000,000. Ultrasonation did not give polymerization rates significantly higher than the thermal polymerization rates when temperature was controlled at 60 plus or minus 1 C in 250 ml and 1000 ml reactors. Dissert. Abstr.

N78-33227 Cincinnati Univ., Ohio.
THERMAL AND MOLECULAR EFFECTS ON SOLID STATE BEHAVIOR OF RIGID POLY(VINYLCHLORIDE) Ph.D. Thesis
Shao-Kuei Thomas Lo 1977 180 p
Avail: Univ. Microfilms Order No. 7811810

The effects of molecular weight, stereoregularity, crystallinity, and thermal-mechanical history on the solid state properties of several poly(vinylchloride) fractions were studied. Characterizations of the fractions were performed with respect to molecular weight and stereoregularity. Compression molded thin films of these fractions were characterized for the crystallinity, frozen stresses, dynamic mechanical properties, and tensile properties. The degrees of crystallinity were also measured on two PVC resins which differ in stereoregularity and were subject to different annealing periods at 100 C. Dynamic mechanical measurements were performed with four frequencies, 3.5, 11, 35, and 110 Hz over the temperature range -160 C to the glass transition temperature of each sample. Dissert. Abstr.

N78-33228* National Aeronautics and Space Administration. Pasadena Office, Calif.
THERMOPLASTIC RUBBER COMPRISING ETHYLENE-VINYL ACETATE COPOLYMER, ASPHALT AND FLUXING OIL Patent
Frank J. Hendel, inventor (to NASA) (JPL) Issued 8 Sep. 1970 3 p Filed 24 Oct. 1966 Continuation-in-part of US Patent Appl. SN-508864, filed 19 Nov. 1965 Sponsored by NASA (NASA-Case-NPO-8835; US-Patent-3,527,724; US-Patent-Appl-SN-588721; US-Patent-Class-260-28.5) Avail: US Patent Office CSCL 11G

A thermoplastic rubber is made from a mixture of between about 10 percent and about 50 percent of asphalt, between about 5 percent and about 30 percent fluxing oil, and between about 35 percent and about 70 percent of a copolymer of polyethylene and vinyl acetate.
Official Gazette of the U.S. Patent Office

N78-33229 Polytechnic Inst. of New York.
A STUDY ON THERMOPLASTIC STRUCTURAL FOAM Ph.D. Thesis
Carlos Arturo Villamizar 1978 211 p
Avail: Univ. Microfilms Order No. 7816649

The flow behavior of gas-charged molten polymers was investigated. A rectangular slit die with glass windows was constructed to permit visual observations, from the direction perpendicular to flow of the dynamic behavior of gas bubbles when a gas-charged molten polymer flows between two parallel planes. Pictures of gas bubbles taken in the flow channel with the aid of a camera attached to a microscope were used to determine the position at which gas bubbles started growing. The gas-charged molten polymer shows a curved pressure profile as the melt approaches the die exit. A polymer melt containing a chemical blowing agent was also studied to gain a better understanding of the dynamic behavior of gas bubbles during the structural foam injection molding operation. Bubble collapse and diffusion-controlled bubble growth experiments are described. Dissert. Abstr.

N78-33230*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF SILICON CARBIDE ON DEVITRIFICATION OF A GLASS COATING FOR REUSABLE SURFACE INSULATION
Philip O. Ransone Oct. 1978 23 p refs
(NASA-TM-78755; L-12069) Avail: NTIS HC A02/MF A01 CSCL 11B

Devitrification (nucleation and growth of cristobalite) were investigated in the LI-0042 coating used for the space shuttle surface insulation. Excessive devitrification was found to be associated with the silicon carbide (SiC) constituent in the coating. Test results show that significant devitrification occurred only when SiC was present in the coating and when the thermal-exposure atmosphere was oxidizing. G.Y.

N78-33231# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
MICROSTRUCTURALLY DEVELOPED TOUGHENING MECHANISMS IN CERAMICS. STRESS-INDUCED MARTENSITIC REACTIONS. 1: THEORY OF METASTABLE PHASE RETENTION AND CONTRIBUTION TO FRACTURE TOUGHNESS Technical Report, 1 Jun. 1977 - 31 May 1978
F. F. Lange Jul. 1978 31 p refs
(Contract N00014-77-C-0441; NR Proj. 032-574(471))
(AD-A057239; SC5117.2TR-1; TR-2) Avail: NTIS HC A03/MF A01 CSCL 11/2

Prevention of a martensitic reaction is explained by relating the internal pressure, which arises through matrix constraint, to pressure-temperature-compositional phase equilibria. To have a constraint, microcracking must be avoided by fabricating the material with a grain/particle size less than a critical value. This is a previous result of theories concerned with crack extension in highly localized stress fields. The contribution of a stress-induced martensitic reaction to fracture toughness is explained in terms of the work done by the crack's stress field to overcome the matrix constraint. This analysis shows that the important factors contributing to the fracture toughness are the structural shape change, the elastic properties of the constraining materials, the volume fraction of the retained metastable phase, and the radius of the transformed zone at the crack front. Author (GRA)

N78-33232# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
MICROSTRUCTURALLY DEVELOPED TOUGHENING MECHANISMS IN CERAMICS. STRESS INDUCED MARTENSITIC REACTION. 2: EXPERIMENTS IN THE ZrO2-Y2-O3 SYSTEM Technical Report, 1 Jun. 1977 - 31 May 1978
F. F. Lange Jul. 1978 19 p refs
(Contract N00024-77-C-0441; NR Proj. 032-574(471))
(AD-A057240; SC5117.3TR-2; TR-3) Avail: NTIS HC A02/MF A01 CSCL 11/2

Retention of the tetragonal phase was found to depend on both density and grain size. The dependence on density is consistent with the need for self-constraint and the concepts developed regarding the thermodynamics of the martensitic reaction in an elastically constrained system. The dependence on grain size and the effect of Y2O3 on the critical grain size is consistent with the theory relating the latent internal pressure (required to maintain equilibrium between the two structures) and the grain size to the thermodynamics of microcracking in a highly localized stress field. The contribution of the stress-induced transformation to the fracture toughness is significant and it is directly related to the volume fraction of the retained tetragonal phase. Theory developed to explain this contribution is in good agreement with experimental data validating the concept that the transformation's contribution lies with the work done

by the crack's stress field to unconstrain the martensitic reaction. Fractography indirectly supports this concept and directly invalidates the concept of microcracking in advance of the primary crack as suggested by others. Author (GRA)

N78-33233# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
MICROSTRUCTURALLY DEVELOPED TOUGHENING MECHANISMS IN CERAMICS. FRACTURE TOUGHNESS OF Si3N4 AS A FUNCTION OF THE INITIAL ALPHA-PHASE CONTENT Technical Report, 1 Jun. 1977 - 31 May 1978
F. F. Lange Jul. 1978 10 p refs
(Contract N00014-77-C-0441; NR Proj. 032-574(471))
(AD-A057241; SC5117.4TR; TR-4) Avail: NTIS HC A02/MF A01 CSCL 11/2

Mixtures of high alpha-Si3N4 and high Beta-Si3N4 powders were hot-pressed with 5 w/o MgO. The critical stress intensity factor of this series of materials increased from 4.16 MPa/m sq to 6.0 MPa/m sq as the initial alpha-Si3N4 increased from 26% to 70% respectively. These results are consistent with the concepts that the Alpha/Beta ratio governs the aspect ratio of the fibrous grains and that fibrous fracture is responsible for the high fracture toughness of Si3N4. Author (GRA)

N78-33234# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
MICROSTRUCTURALLY DEVELOPED TOUGHENING MECHANISMS IN CERAMICS. COMPRESSIVE SURFACE STRESSES DEVELOPED IN CERAMICS BY AN OXIDATION-INDUCED PHASE CHANGE Technical Report, 1 Jun. 1977 - 31 May 1978
F. F. Lange Jul. 1978 18 p refs
(Contract N00014-77-C-0441; NR Proj. 032-574(471))
(AD-A057242; SC5117.5TR; TR-5) Avail: NTIS HC A02/MF A01 CSCL 11/2

Although further work is required to quantify the oxidation kinetics to obtain detailed surface stress distributions, it has been amply demonstrated that significant surface stresses can be developed by an oxidation-induced phase change. This demonstration is important since it opens a new route to increase the reliability of ceramics in applications where the mechanical properties of the surface are important, viz application (e.g., bearing surfaces, erosion, etc.) which involve surface modes of failure. The method described is equivalent to the chemical tempering of glass, and it should have wide applicability to many polyphase ceramics. On the other hand, this work has also demonstrated that the use of such materials in high temperature, oxidizing environments may lead to serious problems. GRA

N78-33235# Army Armament Research and Development Command, Dover, N. J. Large Caliber Weapon Systems Lab.
A TECHNIQUE FOR ASSESSING THE DURABILITY OF STRUCTURAL ADHESIVES
Raymond F. Wegman, Marie C. Ross, Elizabeth A. Garnis, and Stanley A. Santa May 1978 51 p refs
(AD-A057197; AD-E400171; ARLCD-TR-77010) Avail: NTIS HC A04/MF A01 CSCL 11/1

A new method for inexpensively evaluating the durability of a large number of adhesives was developed and evaluated. This test method enables an investigator to simultaneously evaluate many adhesive-adherend variations and to estimate the durability of the variations under conditions of load, temperature, and humidity. The method will save time and money in the screening process used to select the best adhesives and adherend surface treatments for a particular application. The method involves determining the residual strength after the bonded joints are immersed in 60 C water for prescribed periods of time. Data are presented for twelve structural adhesives which are 121 C (250 F) curing systems. The adherends used were 2024T3 aluminum, either acid-dichromate (FPL) etched or anodized, 6 Al-4V titanium and commercially pure (CP) titanium, both phosphate-fluoride etched. Author (GRA)

N78-33236# United States Steel Corp., Monroeville, Pa. Research Lab.
EFFECT OF HYDROSTATIC PRESSURE ON THE DEFORMATION BEHAVIOR OF POLYETHYLENE AND POLYCARBONATE IN TENSION AND IN COMPRESSION Final Report, 1 Jun. 1977 - May 1978
W. A. Spitzig and O. Richmond 30 Jun. 1978 50 p refs
(Contract N00014-76-C-0855)
(AD-A056786; Rept-76-H-031(061/066-1)) Avail: NTIS HC A03/MF A01 CSCL 11/9

The stress-strain response of crystalline high density polyethylene and of amorphous polycarbonate has been determined in tension and in compression at superimposed pressures up to 1104 MPa (160 ksi). All tests were conducted at room temperature and at a single imposed strain rate, and the specimens were coated with silicone rubber to protect them from the pressurizing fluid. Strain softening occurred in the polycarbonate at low pressures but was inhibited by pressure. Tensile necking occurred in both materials, but was promoted by pressure in polyethylene and inhibited in polycarbonate. GRA

N78-33237# Southwest Research Inst., San Antonio, Tex.
DEGRADATION STUDIES OF A TRIMETHYLOLPROPANE TRIHEPTANOATE LUBRICANT BASESTOCK Interim Report, Feb. 1976 - Sep. 1977
J. P. Cuellar, Jr. Dec. 1977 88 p refs
(Contract F33615-76-C-2020)
(AD-A056825; SwRI-RS-657; AFAPL-TR-77-87) Avail: NTIS HC A05/MF A01 CSCL 11/8

Experiments are described to study the thermal and oxidative degradation of a typical neopentyl-type polyol ester lubricant basestock--trimethylolpropane triheptanoate. Utilizing a rotating cylinder device for the formation of a thin fluid film (0.004 in.), the parameters of film temperature, atmosphere moisture, and atmosphere type (inert or oxidative) were investigated with the uninhibited basestock. Program objectives included elucidation of the chemical processes involved in fluid deterioration, particularly as related to the formation of deposits. Reactants and products were measured by various analytical techniques, principally gas chromatography, gas chromatography/mass spectrometry, and X-ray fluorescence spectrometry. A literature search pertinent to the chemistry of synthetic, ester-base lubricants and methods of chemical analysis of such lubricants is also presented. Author (GRA)

N78-33238# Atomics International Div., Golden, Colo. Rocky Flats Plant.
EFFECT OF RADIATION AND ACIDS ON THERMAL STABILITY OF ION EXCHANGE RESINS
A. R. Kazanjian 14 Apr. 1978 13 p refs
(Contract EY-76-C-04-3533)
(RFP-2652) Avail: NTIS HC A02/MF A01

Dowex 1-X4 (anion exchange resin) and Dowex 50-X8 (cation exchange resin) were subjected to gamma and alpha radiation in addition to nitric and hydrochloric acids. The resins then were analyzed by differential thermal analysis and infrared analysis to examine the changes in thermal stability. Gamma irradiation did not affect the thermal stability of Dowex 50-X8 in hydrochloric or nitric acid. Gamma irradiation of Dowex 1-X4 in nitric acid lowers the exotherm temperature approximately 50 degrees Celsius. The effect of alpha radiation on Dowex 1-X4 is about the same as that of gamma radiation, whereas alpha particles are more damaging than gamma rays to Dowex 50-X8. Contacting the unirradiated resins with hydrochloric or nitric acid did not cause degradation, but both resins reacted with nitric acid at elevated temperatures, which created a thermal instability. ERA

N78-33239# Illinois Univ., Urbana. Materials Research Lab.
PHONON THERMAL TRANSPORT METALLIC GLASSES BELOW 100 K Ph.D. Thesis
J. R. Matey 1978 110 p refs
(Contract Ey-76-C-02-1198)
(COO-1198-1205) Avail: NTIS HC A06/MF A01

Measurements of the phonon thermal conductivity of a variety of metallic glasses were made. In each case, the temperature dependence and magnitude of the phonon thermal conductivity of the glassy metal was very similar to that characteristic of nonmetallic glasses. Variation of sound velocity measurements were made on a glassy palladium silicon alloy and qualitative similarity was found between its behavior and the behavior of nonmetallic glasses. These findings and results from other laboratories have led to the conclusion that the localized excitations

responsible for the anomalous behavior of nonmetallic glasses are also present in the metallic glasses. ERA

N78-33240# Argonne National Lab., Ill.
NONDESTRUCTIVE EVALUATION TECHNIQUES FOR HIGH-TEMPERATURE CERAMIC COMPONENTS Quarterly Report, Jan. - Mar. 1978
Mar. 1978 19 p refs
(Contract W-31-109-eng-38)
(ANL/MSD-78-5) Avail: NTIS HC A02/MF A01

The use of holographic interferometry techniques for the nondestructive evaluation of ceramic heat exchanger tubes and ceramic rotors for high temperature (above 1200 C) applications is discussed. ERA

N78-33241# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
HIGH TEMPERATURE PROPERTIES AND PROCESSES IN CERAMICS: THERMOMIGRATION Annual Report, 1 Jan. - 31 Dec. 1977
1977 45 p refs
(Contract EY-76-S-02-2923)
(COO-2923-02) Avail: NTIS HC A03/MF A01

Systematic consideration is reported for each of the elements of atomic transport due to driving forces other than composition gradients in a model ceramic system by: (1) conducting experimental studies on well-defined systems and with measurable boundary conditions; (2) examination of the assumption of local electrochemical equilibrium during transient processes; and (3) by separating the coupling coefficients into well defined kinetic and thermodynamic terms and into those which are truly irreversible in nature. ERA

N78-33242# California Univ., Livermore. Lawrence Livermore Lab.
DEVELOPMENT OF ALTERNATE SILICONE POTTING COMPOUNDS. VOLUME 2: DEVELOPMENT OF THE PRIMARY ALTERNATE FOR DOW CORNING'S AEROSPACE SEALANT, DC 93-119
W. E. Cady and A. T. Buckner 27 Feb. 1978 28 p refs
(Contract W-7405-eng-48)
(UCRL-52434-Vol-2) Avail: NTIS HC A03/MF A01

A substitute for Dow Corning DC 93-119 silicone potting compound can be formulated from Sylgard 184, Dielectric Gel Q3-6527, and accelerator XCF3-6559. variations in the properties of the minor components, Q3 and accelerator, do not affect the properties of the substitute. Alternate formulations should be evaluated to eliminate the problem of bubble entrapment on assembly. ERA

N78-33243# Westinghouse Electric Corp., Crum Lynne, Pa. Combustion Turbine Systems Div.
CERAMICS TECHNOLOGY READINESS DEVELOPMENT PROGRAM. PHASE 1: CONCEPTUAL DESIGNS AND MATERIAL SCREENING Monthly Technical Progress Report, Mar. 1978
K. L. Rieke Apr. 1978 24 p ref
(Contract EF-77-C-01-2786)
(FE-2786-12; MTPR-6) Avail: NTIS HC A02/MF A01

Critical planning information in the form of ceramic turbine conceptual designs and delivery of ceramic test specimens for DOE initial evaluation of erosion/corrosion capability is presented. Results include: (1) The Weibull characteristic strength, sigma/sub to/, was developed for NCX-34 H.P.Si3N4, (2) the simplified method of estimating material uniaxial tensile strength was verified, (3) additional design study was initiated to improve ease of assembly and maintenance of the ceramic blading in the turbine rotor assembly, (4) conceptual design arrangements of the use of ceramics for combustor transition ducting were developed to be used in conjection with a catalytic combustor element, and (5) concept 3 thermal barrier coating performance calculations for coal-derived liquid fuels were extended from the simple engine cycle to the combined cycle performance. ERA

N78-33244# California Univ., Livermore. Lawrence Livermore Lab.
DEVELOPMENT OF ALTERNATE SILICONE POTTING COMPOUNDS. VOLUME 1: EXPERIMENTAL PROGRAM
W. E. Cady 27 Feb. 1978 28 p refs
(Contract W-7405-eng-48)
(UCRL-52434-Vol-1) Avail: NTIS HC A03/MF A01

A cooperative program was devised to develop silicone potting compounds to replace those discontinued by Dow Corning Corporation. The substitutes are based for the most part on commercially available Dow Corning products that are very similar chemically to the discontinued products. ERA

N78-33245# IIT Research Inst., Chicago, Ill.
ASME REPORT ON CHEMICAL EFFECTS OF LUBRICATION IN CONTACT FATIGUE, VOLUME 2 Summary Report, Apr. 1975 - Feb. 1976
S. Bhattacharyya and M. A. H. Howes May 1978 71 p ref Sponsored by ASME
(PB-280980/4; ASME/RCL-1977/1; ASME/RCL-1978/1) Avail: NTIS HC A04/MF A01 CSCL 13I

Contact fatigue tests with synthetic oil in geared roller testing machines were carried out. The tests were used to extend the data base for synthetic oil so that significant Weibull analysis could be made to determine the effect of additive on Weibull slope and stress life exponent. Chemical effects of lubrication in contact fatigue were studied. The supplemental phase of the program extended the data base for synthetic oil established in the initial phases of the program. GRA

N78-33246# National Technical Information Service, Springfield, Va.
POLYCARBORANES. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jul. 1978
Diane M. Cavagnaro Aug. 1978 136 p Supersedes NTIS/PS-77/0705; NTIS/PS-76/0590; NTIS/PS-75/554
(NTIS/PS-78/0865/2; NTIS/PS-77/0705; NTIS/PS-76/0590; NTIS/PS-75/554) Avail: NTIS HC $28.00/MF $28.00 CSCL 11I

The bibliography covers the synthesis, polymerization, and the physical and molecular properties of carborane polymers and copolymers. Dexsil polymers and heat resistant properties are also covered. (This updated bibliography contains 129 abstracts, 12 of which are new entries to the previous edition.) GRA

N78-33247# National Technical Information Service, Springfield, Va.
POLYCARBONATES: PROPERTIES, SYNTHESIS, AND APPLICATIONS. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jul. 1978
Diane M. Cavagnaro Aug. 1978 260 p Supersedes NTIS/PS-77/0718; NTIS/PS-76/0628; NTIS/PS-75/569
(NTIS/PS-78/0754/8; NTIS/PS-77/0718; NTIS/PS-76/0628; NTIS/PS-75/569) Avail: NTIS HC $28.00/MF $28.00 CSCL 11I

The bibliography presents selected annotated references on synthesis, properties, and uses of polycarbonate resins. The physical, mechanical, and chemical behavior of polycarbonates are covered, as well as processing and manufacturing techniques. (This updated bibliography contains 253 abstracts, 26 of which are new entries to the previous edition.) GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N78-33248 Georgia Inst. of Tech., Atlanta.
APPLICATION OF IMPEDANCE TUBE TECHNIQUE IN THE MEASUREMENT OF BURNING SOLID PROPELLANT ADMITTANCES Ph.D. Thesis
Mohammed Salikuddin 1978 253 p
Avail: Univ. Microfilms Order No. 7815850

A modified impedance tube technique was employed in which several microphones were mounted along the length of the tube instead of traversing a microphone inside the tube. An experimental setup consisting of a circular tube, a propellant sample and its

holder, two acoustic drivers, and a pressure regulating exhaust valve was used to obtain the admittance values at low pressures. A high pressure facility designed for operating pressures up to 500 psig was developed to simulate actual rocket motor operating conditions. An analytical procedure and numerical methods were developed for determining the unknown admittance of a burning solid propellant from the measured acoustic pressure data. Studies concerned with the dependence of the impedance tube wave structure upon the propellant surface boundary conditions, particulate matter-acoustic wave interaction and the propellant self-noise were conducted. Dissert. Abstr.

N78-33249 California Inst. of Tech., Pasadena.
MEASUREMENTS OF ENERGY EXCHANGE BETWEEN ACOUSTIC FIELDS AND NON-UNIFORM STEADY FLOW FIELDS Ph.D. Thesis
Kiran Ramanlal Migiawala 1978 184 p
Avail: Univ. Microfilms Order No. 7816954

A significant uncertainty in the interpretation of data taken with T-burners arises because very little is known about some of the acoustics. The influence of a subsonic exhaust vent was investigated using a resonance tube operated at room temperature with different resonance frequencies of the first longitudinal mode of oscillation. Experiments were done over ranges of the average Mach number of the flow in the resonance tube, and with vent having different sizes and shapes. The following major conclusions were predicted and verified: (1) the vent produces a gain of acoustic energy proportional to the average Mach number of the flow in main resonance tube; (2) the gain is proportional to the frequency of the fundamental longitudinal mode; (3) the gain is independent of the shape and size of the ventj Dissert. Abstr.

N78-33250# United Technologies Corp., Sunnyvale, Calif. Chemical Systems Div.
DEVELOPMENT OF A HIGH ACCELERATION GAS GENERATION SYSTEM Final Report, 13 Dec. 1977 - 30 Jun. 1978
J. C. Trowbridge and R. O. MacLaren 30 Jun. 1978 50 p refs
(Contract DAAK40-78-C-0023)
(AD-A056751; CSD-2658-FR) Avail: NTIS HC A03/MF A01 CSCL 13/7

A program was conducted to develop further a solid fuel gas generator system. The gaseous output was cool (less than 550 F) most of its operating time and contained no large (less than 10 micrometers) particulate matter. Tests were conducted from -40 to 165 F to determine ignition delay and thermal sensitivity. Six conformance tests were conducted in flight-type hardware. Five complete nitrogen gas generator systems were delivered to MIRADCOM. Author (GRA)

N78-33251*# Computer Sciences Corp., Bay St. Louis, Miss. Engineering and Science Services Lab.
CLASSIFICATION TESTING OF COMPOSITION A5 AND SELECTED PYROTECHNICS Contractor Report, Apr. 1977 - Apr. 1978
F. L. McIntyre Jun. 1978 18 p refs
(Contract NAS13-50)
(NASA-CR-157744; AD-A056303; AD-E400179; ARTSD-CR-78003) Avail: NTIS HC A02/MF A01 CSCL 19/1

Three pyrotechnic compositions (R284 Tracer Mix, I559 Igniter Mix, and I560 Sub-Igniter Mix) and one high explosive (Composition A5) were subjected to classification tests as outlined in Chapter 3 of U.S. Army Technical Bulletin 700-2, Explosives Hazards Classification Procedure, Change 1. The results indicated that the three pyrotechnic compositions did not exhibit characteristics of a detonation, but they did not pass the impact sensitivity test. The Composition A5 high explosive exhibited characteristics of a detonation. Author (GRA)

N78-33252# Army Armament Research and Development Command, Dover, N. J. Large Caliber Weapon Systems Lab.
ILLUMINATION REQUIREMENTS FOR TARGET RECOGNITION AND REACQUISITION AS A FUNCTION OF FIELD OF VIEW
Robert B. Davis Apr. 1978 23 p
(AD-A057235; AD-E400146; ARLCD-TR-77051) Avail: NTIS HC A02/MF A01 CSCL 19/1

There exists a general lack of information on flare effectiveness in the area of target recognition and reacquisition with the unaided eye. To provide some basic information on this subject, a study was conducted using the Picatinny Arsenal Pyrotechnic Terrain Model. This study examined the relationship between illumination level, target acquisition time, and reacquisition time and the size of the search area. Author (GRA)

N78-33253# Army Armament Research and Development Command, Dover, N. J. Large Caliber Weapon Systems Lab.
THE EFFECTS OF CHANGES IN FLARE IN INTENSITY ON THE RECOGNITION PROBABILITY OF VEHICULAR SIZE TARGETS Final Report
Robert B. Davis and Jesse F. Tyroler Apr. 1978 31 p
(AD-A057238; AD-E400152; ARLCD-TR-77054) Avail: NTIS HC A03/MF A01 CSCL 19/1

The present specifications on minimum acceptable flare intensity are made without any quantitative information on how reductions in intensity influence an observer's ability to recognize targets. A study was conducted, using the Pyrotechnic Terrain Model, to examine the relationship between changes in the intensity of flares and target recognition. Four separate cases were examined having different illumination requirements for recognition. Using these data, three types of illumination flares at three ranges were evaluated to show the decrease in recognition and recognition areas with decreasing intensities. Author (GRA)

N78-33254# Naval Surface Weapons Center, White Oak, Md.
EXPLOSION EFFECTS AND PROPERTIES. PART 2: EXPLOSION EFFECTS IN WATER Final Report
Michael M. Swisdak, Jr. 22 Feb. 1978 114 p
(AD-A056694; NSWC/WOL/TR-76-116-Pt-2) Avail: NTIS HC A06/MF A01 CSCL 19/4

This report updates an earlier report. The tables, charts, and graphs contained herein show the effects of explosives detonated underwater. This compilation enables the user to find, in one report, much information without having to do an extensive literature search. A future report will be issued to update Section D (Explosives Effects and Properties). GRA

N78-33255# Army Armament Research and Development Command, Dover, N. J. Large Caliber Weapons Systems Lab.
ANALYSIS OF IMPURITIES IN COMPOSITION B BY THIN LAYER CHROMATOGRAPHY
T. H. Chen and M. Gilford Apr. 1978 20 p refs
(AD-A056313; AD-E400149; ARLCD-TR-77052) Avail: NTIS HC A02/MF A01 CSCL 19/1

A thin layer chromatographic procedure was developed to identify alpha-TNT associated impurities in Composition B. The method involved reducing RDX and alpha-TNT levels in the solubilized Composition B sample before two-dimensional chromatographic developing. Impurities were identified after applying ethylenediamine reagent. Color development, fluorescence quenching, and R sub f values were compared to those established for a variety of impurities known to be present in Military Grade alpha-TNT. Six fragments from a Composition B warhead (which were not premature but was taken from the same lot as those suspected of premature functioning) and a control sample of Composition B obtained from the Holston Army Ammunition Plant were analyzed and compared. The analyses revealed the presence of m-nitrotoluene impurity in only the fragment samples suspected of premature initiation. Author (GRA)

N78-33256# Department of Energy, Washington, D. C.
DEPARTMENT OF ENERGY POSITION PAPER ON ALCOHOL FUELS
Mar. 1978 6 p
(DOE/US-0001/1) Avail: NTIS HC A02/MF A01

The supply, utilization, and economic characteristics of alcohols (methanol and ethanol) and the major issues associated with their implementation are briefly described. The major elements in the current evaluation of alcohol fuels as a candidate for federally-assisted commercialization of a nonpetroleum fuel are also described. ERA

N78-33257# Arizona State Univ., Tempe. Coll. of Engineering and Applied Sciences.
CONVERSION OF CELLULOSIC AND WASTE POLYMER MATERIAL TO GASOLINE Progress Report
J. L. Kuester Nov. 1977 5 p refs
(Contract Ey-76-S-02-2982)
(COO-2982-21) Avail: NTIS HC A02/MF A01

Improvements in the composition of pyrolysis gas produced by the Fischer-Tropsch catalytic reactor and operational difficulties are reported. The effects of pressure on product yields are discussed. ERA

N78-33258# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
CATALYTIC CONVERSION OF SOLVENT REFINED COAL TO LIQUID PRODUCTS M.S. Thesis
Kylan f. Tanner and Alexis T. Bell Feb. 1978 98 p refs
(Contract W-7405-eng-48)
(LBL-6807) Avail: NTIS HC A02/MF A01

Catalytic reactions of solvent refined coal (SRC) were studied using mixed metal oxide and low melting Lewis acid catalysts in extracting solvent media. From characterization of the benzene- and cyclohexane-soluble products, ZnCl2 and SnCl2 were determined to be the most effective at hydrogenating and solubilizing SRC while assisting in heteroatom removal. ZnCl2 and SnCl2 were also found to be more effective at producing oil-like products rather than alphaltene-like products. Further enhancement of the solubilization of SRC could be achieved by the addition of isopropanol to the Lewis acid-substrate-solvent reaction mixture. Dry HCl was also investigated for its effect on the solubilization of SRC. The solubilized products and residues were characterized and the effect of reaction temperature, hydrogen pressure, and catalyst loading on the yield of soluble products were studied. ERA

N78-33259# Battelle Columbus Labs., Ohio
FUELS FROM SUGAR CROPS Quarterly Report
E. S. Lipinsky, S. Kresovich, T. A. McClure, and W. T. Lawhon 31 Jan. 1978 89 p refs
(Contract W-7405-eng-92-077)
(TID-28191; QR-3) Avail: NTIS HC A05/MF A01

Substantial progress was made on both the agricultural and the processing aspects of these fuels from biomass research program. Harvesting operations were performed at all locations for both sugarcane and sweet sorghum. Although final yield data were not statistically analyzed, it is apparent that large gains in total biomass were achieved through the introduction of narrow row spacing. An agronomic demonstration of sweet sorghum production in the Midwest was carried out. The information collected indicated sweet sorghum showed considerable potential in the Midwest, provided that short season processing problems can be overcome. Total biomass yields reached values of 25.6 metric tons per hectare on a dry weight basis. Under nonirrigated conditions, it appeared that sweet sorghum was energy self-sufficient. Laboratory work on bagasse drying rates was initiated. ERA

N78-33260# California Univ., Berkeley. Lawrence Berkeley Lab.
PROCESS DEVELOPMENT STUDIES ON THE BIOCONVERSION OF CELLULOSE AND PRODUCTION OF ETHANOL
C. R. Wilke 1 Feb. 1978 20 p refs
(Contract W-7405-eng-48)
(LBL-6881) Avail: NTIS HC A02/MF A01

The No-O2 pretreatment of wheat straw prior to enzymatic hydrolysis was investigated. Studies of the conversion of xylose to ethanol by Fusarium oxysporum were continued. Progress is also reported on pilot plant process development and design studies on continuous cellulase production, enzyme recovery, batch cellulase enzyme production from Trichoderma viride, and kinetic modeling of the enzymatic hydrolysis of 5 percent newsprint. ERA

N78-33261# Department of Energy, Bartlesville, Okla. Energy Research Center.
PERFORMANCE OF GASOLINE AND DIESEL FUELS PRODUCED FROM COED SYNCRUDE
R. L. Bechtold and R. D. Fleming Jun. 1978 26 p refs
(BERC/RI-78/2) Avail: NTIS HC A03/MF A01

Fuel consumption and exhaust emissions characteristics were evaluated for gasoline and diesel fuel produced from coal liquid derived syncrude. The engine types used were: (1) current technology spark-ignition, homogeneous charge, (2) stratified-charge, and (3) Stirling. There were no significant changes in fuel consumption or exhaust emissions between syncrude-derived fuels and conventional fuels in stratified-charge and Stirling engines. Because of its low (approximately equal to 70) synthetic gasoline required a reduction in compression ratio to achieve knock-limited, MBT spark timing. This was in comparison to the reference gasoline, in a single cylinder, spark ignited, test engine, at one speed/load point. Exhaust emissions were very similar between the two fuels. ERA

N78-33262# National Technical Information Service, Springfield, Va.
ALCOHOL FUELS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jun. 1978
Diane M. Cavagnaro Jul. 1978 193 p Supersedes NTIS/PS-77/0620
(NTIS/PS-78/0673/0; NTIS/PS-77/0620) Avail: NTIS HC $28.00/MF $28.00 CSCL 21D

The bibliography covers Federally-funded research on alcohol based fuels that might have to be used in the future as a fuel source. The citations cover synthesis, chemical analysis, performance testing, processing, pollution, economics, environmental effects, and feasibility. GRA

N78-33263# National Technical Information Service, Springfield, Va.
ALCOHOL FUELS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jun. 1978
Diane M. Cavagnaro Jul. 1978 198 p Supersedes NTIS/PS-77/0621
(NTIS/PS-78/0674/8; NTIS/PS-77/0621) Avail: NTIS HC $28.00/MF $28.00 CSCL 21D

The bibliography covers the different blends, synthesis, processes used, properties, engine performance evaluations, economics, safety measures, pollution effects, and combustion studies. The research also covers sources from which alcohol fuels can be obtained; such as coal, solid wastes, industrial by-products, and agricultural wastes. GRA

N78-33264# Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla. Div. of Biology and Living Resources.
PHOTOPRODUCTION OF HYDROGEN BY MARINE BLUE-GREEN ALGAE Progress Report, 15 Jun. - 15 Dec. 1977
Akira Mitsui 1977 53 p refs
(Grant NSF AER-77-11545)
(PB-280995/2; NSF/RA-770482) Avail: NTIS HC A04/MF A01 CSCL 06A

A survey of tropical Atlantic marine photosynthetic organisms was conducted in order to find an organism exhibiting exceptionally high hydrogen producing capabilities. Such an organism was found in the form of a blue-green algal strain, Miami BG7. As part of an in-depth investigation of hydrogen production in this species, the mechanisms of this process and hydrogen photoproduction were studied. The use of various metabolic inhibitors to investigate the biochemical pathways of hydrogen production was investigated. Results indicate that the process is strongly photodependent. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N78-33265*# General Electric Co., Schenectady, N. Y.
FLOATING SUBSTRATE PROCESS: LARGE-AREA SILICON SHEET TASK LOW-COST SOLAR ARRAY PROJECT Final Report
M. Garfinkel and R. N. Hall 23 Jun. 1978 85 p
(Contract JPL-954350)
(NASA-CR-157759; DOE/JPL-954350-78/3) Avail: NTIS

HC A05/MF A01 CSCL 13H

Supercooling of silicon-tin alloy melts was studied. Values as high as 78 C at 1100 C and 39 C at 1200 C were observed, corresponding to supersaturation parameter values 0.025 and 0.053 at 1050 C and 1150 C, respectively. The interaction of tin with silane gas streams was investigated over the temperature range 1000 to 1200 C. Single-pass conversion efficiencies exceeding 30% were obtained. The growth habit of spontaneously-nucleated surface growth was determined to be consistent with dendritic and web growth from singly-twinned triangular nucleii. Surface growth of interlocking silicon crystals, thin enough to follow the surface of the liquid and with growth velocity as high as 5 mm/min, was obtained. Large area single-crystal growth along the melt surface was not achieved. Small single-crystal surface growth was obtained which did not propagate beyond a few millimeters. L.S.

N78-33266*# TRW Defense and Space Systems Group, Redondo Beach, Calif.

FEASIBILITY DEMONSTRATION FOR ELECTROPLATING ULTRA-THIN POLYIMIDE FILM Final Report, 22 Aug. 1977 - 1 Jun. 1978

R. Schneier, T. V. Braswell, and R. W. Vaughn Aug. 1978 25 p Prepared for JPL

(Contract NAS7-100; JPL-954771)

(NASA-CR-157775; TRW-32052-6009-RU-00) Avail: NTIS HC A02/MF A01 CSCL 13H

The effect of electrodeposition variables on film thickness was investigated using a dilute polyimide solution as a bath into which aluminum (as foil or as a vapor deposited coating) was immersed. The electrodeposited film was dried for 2 hours at 93 C (primarily to remove solvent) and cured for 18 hours at 186 C. Infrared studies indicate that imide formation (curing) occurs at 149 C under vacuum. From a conceptual viewpoint, satisfactory film metallized on one side can be obtained by this method. The cured ultra thin polyimide film exhibits properties equivalent to those of commercial film, and the surface appearance of the strippable polyimide film compares favorably with that of a sample of commercial film of thicker gauge. The feasibility of manufacturing approximately one million sq m of ultra thin film capable of being joined to fabricate an 800 m by 9 800 m square from starting material 0.5 to 1 m wide for space erectable structures was demonstrated. A.R.H.

N78-33267# Tetra Tech, Inc., Pasadena, Calif.

VULNERABILITY OF SURFACE EFFECT VEHICLES TO EXPLOSION GENERATED WATER WAVES Final Report

S. Wang, R. Wade, and T. W. Wier Dec. 1977 185 p refs

(Contract N00024-76-C-0261; NR Proj. 089-114)

(AD-A055503; TETRAT-TC-645) Avail: NTIS HC A09/MF A01 CSCL 13/10

The objectives of the study are: to develop a mathematical model appropriate for analysis of the behavior of surface effect vehicles (SEV) in unusually large waves; and subsequently to apply this model to investigate the vulnerability of these vehicles to explosion generated waves. The generation of surface waves due to an explosion is modeled mathematically as a function of the explosive yield, detonation depth and water depth. Further, the dynamic property of the propagated waves is treated to vary with the local water depth. The SEV dynamics are modeled mathematically by considering the vehicle as a rigid body having six degrees of freedom in space subject to an appropriate constraint derived from the cushion air dynamics as well as to the environmental excitations due to waves. Non-linear contributions including effects due to large motions, viscous flows, and control logics are considered and vehicle responses are solved numerically through time domain simulations. Analyses have been conducted using this analytical model to examine the potential threat of underwater explosions to a typical 2000 ton class SES, and the operational envelopes for such a vehicle in explosion generated wave enviornments are developed and discussed. GRA

N78-33268# Airco, Inc., Murray Hill, N. J. Corporate Research and Development Dept.

REPORT ON WORK PERFORMED UNDER P. O. 9667503, TASK 2

P. J. Singh 3 Mar. 1978 15 p

(Contract W-7405-eng-48)

(UCRL-13829) Avail: NTIS HC A02/MF A01

Research progress on the development of a superconducting cable for use in superconducting magnets is reported. The work performed consisted of: (1) determination of Cu stabilizer sheath width for 6.50 + or - 0.05 mm (0.256 + or - 0.02 in) square core, using existing equipment and various sized Cu cores; (2) determination of the effects of punching and annealing on sheath width; (3) determination of the current density for obtaining smooth Pb/Sn electrodeposits on the core; (4) determination of the plating solution and electrode parameters for obtaining a plated solder composition of 86 to 92% by weight Pb, remainder Sn; and (5) resistance ratio tests on welded Cu strip samples. The experimental details together with the discussion of the results are presented. ERA

N78-33269# Sandia Labs., Albuquerque, N. Mex.

SURFACE CLEANING IN THIN FILM TECHNOLOGY

D. M. Mattox 1978 33 p refs Presented at a Conf. on Met. Coatings, San Francisco, 3 Apr. 1978

(Contract EY-76-C-04-0789)

(SAND-77-1716C; Conf-780430-2) Avail: NTIS HC A03/MF A01

A clean surface is one that contains no significant amounts of undesirable material. The types and origin of various contaminants are discussed. Since cleaning is often equated with adhesion, the mechanisms of adhesion to oxide, metal, and organic surfaces are reviewed and cleaning processes for these surfaces are outlined. Techniques for monitoring surface cleaning are presented, and the importance of storage of clean surfaces is discussed. An extensive bibliography is given. ERA

N78-33270# Snell (Foster D.), Inc., Florham Park, N. J.

ASSESSMENT OF INDUSTRIAL HAZARDOUS WASTE PRACTICES, RUBBER AND PLASTICS INDUSTRY: EXECUTIVE SUMMARY Final Report, Apr. 1975 - Apr. 1976

Joel M Kushnir and Stephen F. Nagy Mar. 1978 61 p 4 Vol.

(Contract EPA-68-01-3194)

(PB-282070/2; EPA-530/SW-163C-1) Avail: NTIS HC A04/MF A01 CSCL 11I

Industries are characterized in terms of number, location, size and age of plants, products, processes, etc; identifies and quantifies those wastes which are or may be generated by these industries; describes current practices for treatment and disposal; determines the control technology and estimates the cost of control technology. The information was acquired from review of published information; trade association participation; personal contacts; visits to various plants and corporate offices of germane companies; waste sample analysis; and the application of an econometric model to project waste loads for 1977 and 1983. GRA

N78-33271# Snell (Foster D.), Inc., Florham Park, N. J.

ASSESSMENT OF INDUSTRIAL HAZARDOUS WASTE PRACTICES, RUBBER AND PLASTICS INDUSTRY: PLASTIC MATERIALS AND SYNTHETICS INDUSTRY Final Report, Apr. 1975 - Apr. 1976

Joel M. Kushnir and Stephen F. Nagy Mar. 1978 221 p refs 4 Vol.

(Contract EPA-68-01-3194)

(PB-282071/0; EPA-530/SW-163C-2) Avail: NTIS HC A10/MF A01 CSCL 11I

Chapter 2 of this Final Report is presented in this document. This chapter covers plastic materials and synthetics industry. G.Y.

N78-33272# Snell (Foster D.), Inc., Florham Park, N. J.

ASSESSMENT OF INDUSTRIAL HAZARDOUS WASTE PRACTICES, RUBBER AND PLASTICS INDUSTRY: RUBBER PRODUCTS INDUSTRY Final Report, Apr. 1975 - Apr. 1976

Joel M. Kushnir and Stephen F. Nagy Mar. 1978 239 p refs 4 Vol.

(Contract EPA-68-01-3194)

(PB-282072/8; EPA-530/SW-163C-3) Avail: NTIS HC A11/MF A01 CSCL 11I

Chapter 3 of this Final Report is presented. This chapter covers the rubber products industry. Sections included in this chapter are: (1) description of the rubber products industry; (2) tires and inner tubes industry; (3) rubber and plastics footwear industry; (4) reclaimed rubber industry; (5) rubber and plastic hose and belting industry; (6) fabricated rubber products, not FLSE-where classified (N.E.C.);(7) treatment and disposal technology for potential hazardous wastes, rubber products industry; and (8) cost analysis for treatment and disposal of potential hazardous waste, rubber products industry. G.Y.

N78-33273# Snell (Foster D.), Inc., Florham Park, N. J.
ASSESSMENT OF INDUSTRIAL HAZARDOUS WASTE PRACTICES, RUBBER AND PLASTICS INDUSTRY: APPENDICES Final Report, Apr. 1975 - Apr. 1976
Joel M. Kushnir and Stephen F. Nagy Mar. 1978 46 p refs 4 Vol.
(Contract EPA-68-01-3194)
(PB-282073/6; EPA-530/SW-163C-4) Avail: NTIS HC A03/MF A01 CSCL 11I

Appendices to this Final Report are presented. The appendices include: (1) program methodology; (2) protocols used and results obtained in analysis of waste stream samples; (3) hazardous waste contractors and service organization; and (4)detailed definition of the plastics and rubber industry. G.Y.

N78-33274# National Bureau of Standards, Washington, D. C.
JOURNAL OF RESEARCH OF THE NATIONAL BUREAU OF STANDARDS. VOLUME 83, NO. 1, JANUARY - FEBRUARY 1978
1978 119 p refs
(PB-281311/1) Avail: NTIS HC A06/MF A01 CSCL 07D

Tubular flow reactors with first-order kinetics and units in magnetism are discussed. The first spectrum of ytterbium and norm approximation problems and normal statistics are also reviewed, along with vector-valued entire functions of bounded index, satisfying a differential equation. GRA

N78-33275# National Technical Information Service, Springfield, Va.
ELECTROPOLISHING. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jun. 1978
Diane M. Cavagnaro Jul. 1978 240 p
(NTIS/PS-78/0712) Avail: NTIS HC $28.00/MF $28.00 CSCL 13H

Worldwide citations covering different aspects of electropolishing and electrochemical machining are presented. Some areas that are covered include metal cutting, electrochemistry, processes, corrosion protection, and materials that are used. G.Y.

N78-33276# National Bureau of Standards, Boulder, Colo. Thermophysical Properties Div.
PUBLICATION AND SERVICES OF THE CRYOGENICS DIVISION, NATIONAL BUREAU OF STANDARDS, 1953 - 1977
D. J. Frizen and J. R. Mendenhall Apr. 1978 105 p refs
(PB-281465/5; NBS-TN-1005) Avail: NTIS HC A06/MF A01 CSCL 20M

This NBS technical note catalogs the publications of the cryogenics division, along with author and subject indexes, for the period 1953 through 1977. It also contains a listing of available thermodynamic properties charts, bibliographies, and miscellaneous reports of cryogenic interest. A resume of the activities of and services provided by the cryogenics division is also included. GRA

N78-33277# California Univ., Berkeley. Architecture Life Safety Group.
LEARNING FROM FIRE: A FIRE PROTECTION PRIMER FOR ARCHITECTS Final Report
Lars Lerup, David Cronrath, and John Koh Chiang Liu 1977 118 p refs Sponsored by National Fire Prevention and Control Administration
(PB-283163/4) Avail: NTIS HC A06/MF A01 CSCL 13M

The findings of a major study concerning fire research are presented. A framework is presented for the integration of fire safety issues within the larger context of the architectural design process. The issues, vocabulary, concepts and approaches relevant to the architect are presented. In introducing a systematic and theory-based approach to design for fire safety in buildings, the report provides the architect with the knowledge and the vocabulary needed to communicate effectively with fire protection engineers and building officials. GRA

N78-33278# National Technical Information Service, Springfield, Va.
CLOSED LOOP CONTROL SYSTEMS. PART 2: MISCELLANEOUS APPLICATIONS. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1975 - Jul. 1978
Guy E. Habercom, Jr. Aug. 1978 259 p Supersedes NTIS/PS-77/0801
(NTIS/PS-78/0810/8; NTIS/PS-77/0801) Avail: NTIS HC $28.00/MF $28.00 CSCL 16D

Closed loop control systems are investigated relevant to design, application, and performance. Such diversified application as gas turbine engine controls, feedback control of spacecraft and missiles, wind tunnel flow control, and feedback control of laser pulses are examined. This updated bibliography contains 252 abstracts, 46 of which are new entries to the previous edition. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N78-33279 Iowa State Univ. of Science and Technology, Ames.
A METHOD OF DETECTING AND CHARACTERIZING SUBSURFACE LAYERS BY MEANS OF ELECTROMAGNETIC DEPTH SOUNDING Ph.D. Thesis
Won Kil Choi 1978 188 p
Avail: Univ. Microfilms Order No. 7813222

A complete solution is provided for the mutual impedance ratio of a horizontal magnetic dipole source and a horizontal loop antenna over a multi-layer earth under the condition that the quasi-static approximation is valid. The phase angle of the mutual impedance ratio, which is found to be capable of the best resolution of the subsurface geoelectrical parameters, was considered as a tool for the detection and characterization of the subsurface layers. A new method for the numerical evaluation of the Hankel transform was applied to this EM sounding technique to generate the mutual impedance ratio curves at a considerable saving of computer time. Several new methods of interpreting the field data in terms of a three-layer earth model are also introduced. Dissert. Abstr.

N78-33280 California Univ., Berkeley.
THE PERFORMANCE OF DIGITAL MATCHED FILTERS FOR MULTILEVEL SIGNALS Ph.D. Thesis
Gideon Levita 1977 133 p
Avail: Univ. Microfilms Order No. 78-12655

Digital matched filters (DMF's) with multilevel quantizers, which are matched to multilevel amplitude and phase modulated signals, were considered. Quite general expressions for the DMF's output signal-to-noise ratio (SNR) were obtained for the case in which the interference has a symmetric, differentiable probability density distribution as well as for incoherent CW interference. For these types of interference, SNR was shown to be separable into two factors, which represent the effects of quantization and the correlation. The two factors were optimized independently of each other. The optimal SNR X for Gaussian interference was proven to be bounded from above by SNR X for the analog matched filter and from below by that of DMF with hard limiter as a quantizer. Finally, it was shown for the types of interference described that no improvements of performance beyond that achieved for binary AM or bi-orthogonal phi M can be achieved by multilevel signaling. Dissert. Abstr.

N78-33281 Pennsylvania Univ., Philadelphia.
RADAR PROCESSING WITH BASEBAND HARD LIMITING Ph.D. Thesis

Marvin Ira Rozansky 1978 182 p
Avail: Univ. Microfilms Order No. 7816350

Radar target processing is considered in the presence of clutter and thermal noise with hard limiting at baseband or, equivalently, digitization to one bit in each of the in-phase and quadrature channels. The advantages of this technique include dynamic range compression, implementational savings, insensitivity to certain types of jamming, etc. Derived are the design parameters for the optimum tapped delay line processor with hard limiting under the mean squared signal-to-interference ratio criterion. Additional analytical expressions are derived for the autocorrelation of the limited waveform for the cases in which the interference is white and completely correlated.
Dissert. Abstr.

N78-33282 Wisconsin Univ. - Madison.
GROUNDWAVE PROPAGATION AND RADIATION PATTERNS OF A VERTICAL ELECTRIC DIPOLE OVER A RADIALLY VARYING SURFACE IMPEDANCE PLANE Ph.D. Thesis
Chojan S. Teng 1978 155 p
Avail: Univ. Microfilms Order No. 7811745

Electromagnetic wave propagation over and radiation from radially varying surface impedance planes is studied by numerical methods using integral formulations of the compensation theorum. The source is taken to be a vertical electric dipole (VED) situated either on or above the plane. The arbitrary surface impedance profile on the plane is assumed known and only varies radially. For one-section radial wire ground systems, radiation patterns become nearly identical when the system size exceeds some limit beyond which the wires are too long to be effective. It is also found that the radially varying feature of the radial wire system tends to suppress side lobes which are otherwise present with perfectly conducting disc systems. Two-section wire systems can give stronger low angle radiation with the proper choice of the inner section size, outer section size, and the number of radial wires in each section. The sloping beach is found to have little effect on the radiation pattern compared to that for an abrupt coastline.
Dissert. Abstr.

N78-33283*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN AIRBORNE METEOROLOGICAL DATA COLLECTION SYSTEM USING SATELLITE RELAY (ASDAR)
James W. Bagwell and Bruce G. Lindow 1978 17 p ref To be presented at the Intern. Telemetering Conf., Los Angeles, 14-16 Nov. 1978 Sponsored by the Instr. Soc. of America
(NASA-TM-78992; E-9768) Avail: NTIS HC A02/MF A01 CSCL 17B

The National Aeronautics and Space Administration (NASA) has developed an airborne data acquisition and communication system for the National Oceanic and Atmospheric Administration (NOAA). This system known as ASDAR, the Aircraft to Satellite Data Relay, consists of a microprocessor based controller, time clock, transmitter and antenna. Together they acquire meteorological and position information from existing aircraft systems on B-747 aircraft, convert and format these, and transmit them to the ground via the GOES meteorological satellite series. The development and application of the ASDAR system is described with emphasis on unique features. Performance to date is exceptional, providing horizon-to-horizon coverage of aircraft flights. The data collected is of high quality and is considered a valuable addition to the data base from which NOAA generates its weather forecasts.
Author

N78-33284*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EFFECT OF SURFACE ROUGHNESS ON THE MICROWAVE EMISSION FROM SOILS
B. J. Choudhury (Computer Sci. Corp., Silver Spring, Md.), T. J. Schmugge, R. W. Newton (Texas A and M Univ., College Station), and A. T. C. Chang Aug. 1978 30 p refs Submitted for publication
(NASA-TM-79606) Avail: NTIS HC A03/MF A01 CSCL 20N

The effect of surface roughness on the brightness temperature of a moist terrain was studied through the modification of Fresnel reflection coefficient and using the radiative transfer equation. The modification involves introduction of a single parameter to characterize the roughness. It is shown that this parameter depends on both the surface height variance and the horizontal scale of the roughness. Model calculations are in good quantitative agreement with the observed dependence of the brightness temperature on the moisture content in the surface layer. Data from truck mounted and airborne radiometers are presented for comparison. The results indicate that the roughness effects are greatest for wet soils where the difference between smooth and rough surfaces can be as great as 50K.
G.Y.

N78-33285# Geophysical Observatory, Sodankyla (Finland).
MULTIFREQENCY RIOMETER MEASUREMENTS AT HIGH LATITUDES
Hickka Ranta and Aarne Ranta Finn. Acad. of Sci. and Letters Sep. 1978 13 p refs
(Rept-27) Avail: NTIS HC A02/MF A01

The diurnal variation of the radio wave absorption measured by a riometer is the same kind at the frequencies 20 MHz, 27.6 MHz, 40 MHz and 50 MHz at the high latitude station Sodankyla (L=5.1) having two maxima, the one at midnight and another one in the morning side. The variation of n in the equation sub 1 A/sub 2 A = (f sub 2/f sub 1)n, where A = radio wave absorption (db) and f = used frequency, is studied. The daily and seasonal variation of n shows that n is smaller under sunlit conditions than during darkness, meaning that ionization is lower under sunlit conditions. No difference could be observed in comparing the values of n caused by precipitated electrons to nightside to those causing ionization in the dayside supporting the view that the energies of those particles ionizing the D region in the nighttime and daytime do not differ enough to be detected by this experiment.
Author

N78-33286*# Westinghouse Electric Corp., Baltimore, Md.
COMMUNICATIONS LINK CHARACTERIZATION EXPERIMENT (CLCE) TECHNICAL DATA REPORT, VOLUME 2
Apr. 1977 33 p refs
(Contract NAS5-20729)
(NASA-CR-156808; FIS-77-4007-Vol-2) Avail: NTIS HC A03/MF A01 CSCL 17B

The results are presented of the long term rain rate statistical analysis and the investigation of determining the worst month statistical from the measured attenuation data caused by precipitation. The rain rate statistics cover a period of 11 months from July of 1974 to May of 1975 for measurements taken at the NASA, Rosman station. The rain rate statistical analysis is a continuation of the analysis of the rain rate data accumulated for the ATS-6 Millimeter Wave Progation Experiment. The statistical characteristics of the rain rate data through December of 1974 is also presented for the above experiment.
L.S.

N78-33287*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Electrical Engineering.
A DEPOLARIZATION AND ATTENUATION EXPERIMENT USING THE COMSTAR AND CTS SATELLITES Data Report, Dec. 1976 - Mar. 1978
C. W. Bostian, E. A. Manus, R. E. Marshall, W. P. Overstreet, R. R. Persinger, J. D. Powell, P. Santago, W. L. Stutzman, and P. H. Wiley 28 Apr. 1978 198 p
(Contract NAS5-22577)
(NASA-CR-156848) Avail: NTIS HC A09/MF A01 CSCL 20N

Monthly statistical data are presented on ground rainfall rate and attenuation of satellite downlinks at 11.7 GHz, 19.04 GHz, and 28.56 GHz and on cross-polarization isolation at 11.7 GHz. Regression equations for relating isolation to attenuation, attenuation to rain rate, and attenuation at one frequency to attenuation at another frequency are also included. Longer-term statistics are also presented and discussed.
G.G.

N78-33288*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Electrical Engineering.
THE PHASE OF THE CROSSPOLARIZED SIGNAL GENERATED BY MILLIMETER WAVE PROPAGATION THROUGH RAIN Interim Report
W. P. Overstreet and C. W. Bostian Jun. 1978 202 p refs
(Contract NAS5-22577)
(NASA-CR-156841; IR-1978-2) Avail: NTIS

HC A10/MF A01 CSCL 20N

Proposed schemes for cancelling rain-induced crosstalk in dual-polarized communications systems depend upon the phase relationships between the wanted and unwanted signals. This report investigates the phase relationship of the rain-generated crosspolarized signal relative to the copolarized signal. Theoretical results obtained from a commonly accepted propagation model are presented. Experimental data from the Communications Technology Satellite beacon and from the Comstar beacon are presented and the correlation between theory and data is discussed. An inexpensive semi-adaptive cancellation system is proposed and its performance expectations are presented. The implications of phase variations on a cancellation system are also discussed. Author

N78-33289*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AN APPROXIMATE SOLUTION FOR THE FREE VIBRATIONS OF ROTATING UNIFORM CANTILEVER BEAMS

David A. Peters Sep. 1973 43 p refs Revised

(NASA-TM-X-62299; A-5137) Avail: NTIS HC A03/MF A01 CSCL 20K

Approximate solutions are obtained for the uncoupled frequencies and modes of rotating uniform cantilever beams. The frequency approximations for flab bending, lead-lag bending, and torsion are simple expressions having errors of less than a few percent over the entire frequency range. These expressions provide a simple way of determining the relations between mass and stiffness parameters and the resultant frequencies and mode shapes of rotating uniform beams. Author

N78-33290# National Aviation Facilities Experimental Center, Atlantic City, N. J.

DIGITIZED RADAR DATA COMPRESSOR Final Report, Jan. 1974 - Dec. 1976

Edwin A. Mack and Arthur R. Moss Jul. 1978 107 p

(AD-A057442; FAA-NA-78-2; FAA-RD-78-48) Avail: NTIS HC A06/MF A01 CSCL 17/9

This special-purpose device is designed specifically to increase radar data recording capabilities at air route traffic control centers. The DACOMP accomplishes this by compressing the number of channels each radar occupies prior to recording, thereby reducing the number of tape tracks required for each radar. The three 2400 bit-per-second channels of a digitized radar are compressed onto one high-speed (9375 bit-per-second) channel. Because of the threefold reduction in recording track requirements, DACOMP's will record information from an increased number of radar sites. The installation, use, theory of operation, and maintenance of the DACOMP are detailed. G.G.

N78-33291# National Aviation Facilities Experimental Center, Atlantic City, N. J.

TERMINAL RADAR INTERFERENCE CRITERIA STUDY Final Report, Jan. - Dec. 1976

John Kenton Jun. 1978 84 p refs

(FAA Proj. 213-061-110)

(AD-A057280; FAA-NA-77-20; FAA-RD-78-75) Avail: NTIS HC A05/MF A01 CSCL 17/9

Tests were undertaken to investigate the relationship between pulsed-type interference and the air traffic controller working in the terminal area. This was done by recording a series of pulsed-type interference cases and combining them with simulated analog radar targets to form a set of scenarios for display to a group of Federal Aviation Administration (FAA) controllers. Several operational responses were used as performance measures to investigate interference criteria. The interference cases were then quantified and ordered based on two indexing schemes. Tests based on the indices and the performance measures revealed that correlations exist between the operational responses and the interference cases. Author

N78-33292# Electronics Engineering Group (1842nd), Scott AFB, Ill. Digital and Narrowband Systems Branch.

PROTOTYPE HIGH FREQUENCY (HF) INTERCEPT CAPABILITY FOR THE TACTICAL AIRBASE WEATHER ELEMENT (TABWE)

Daniel H. Casey 15 May 1978 13 p

(AD-A055685; Rept-1842EEG/EETD-TR-78-7) Avail: NTIS HC A02/MF A01 CSCL 17/2

The Tactical Weather System (TWS) is a system of ten modules of mobile communications and meteorological equipment. The modules are divided into two components; the Tactical Weather Analysis Center (TWAC) and the Tactical Air Base Weather Element (TABWE). The TWAC receives weather information by HF radio and relays this information to the TABWE. The TABWE does not have its own HF intercept capability and could not perform its mission if deployed without the support of the TWAC. This report describes a prototype installation of HF radio equipment in the TABWE. Author (GRA)

N78-33293# Naval Research Lab., Washington, D. C.

EVALUATION OF A TRIAXIAL SQUID MAGNETOMETER DESIGNED FOR USE AS AN ELF MAGNETIC ANTENNA Interim Report

S. A. Wolf, R. J. Dinger, and J. Goldstein Apr. 1978 29 p (RR0110242)

(AD-A056361; AD-E000172; NRL-MR-3757) Avail: NTIS HC A03/MF A01 CSCL 09/5

A triaxial SQUID magnetometer system has been proposed for use in a submarine towed ELF receiving antenna system. This report describes the testing of the magnetometer system to determine the magnetic orthogonality among the channels of the system, the instrument noise level and responsivity. The other parameters of the system, mostly electrical in nature, had been determined previously. Author (GRA)

N78-33294# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

ELECTROMAGNETIC RADIATION ANALYSIS

10 Apr. 1978 18 p Supersedes MTP-6-1-006-3

(AD-A056647; TOP-6-2-559; MTP-6-1-006-3) Avail: NTIS HC A02/MF A01 CSCL 09/3

A methodology is given for determining whether electromagnetic radiation of sufficient strength to cause performance degradation to the test item exists at the test item location. The results of an electromagnetic radiation effects test are used to identify the radio frequencies and electromagnetic radiation levels to which the test item is susceptible. Further, using a test bed, comparisons are made with the representative signal levels to determine if the levels at which the test item suffers performance degradation would occur in the field. Signal transmission characteristics are developed for each radiation source to provide recommended minimum separation criteria. Author (GRA)

N78-33295# Pacific-Sierra Research Corp., Santa Monica, Calif.

ELF PROPAGATION IN A NON-STRATIFIED EARTH-IONOSPHERE WAVEGUIDE Final Report

E. C. Field, Jr. Apr. 1978 38 p refs

(Contract N00014-76-C-0584)

(AD-A056143; PSR-806) Avail: NTIS HC A03/MF A01 CSCL 20/14

This report analyzes extremely low-frequency (ELF) propagation under conditions where the properties of the earth-ionosphere waveguide change markedly over transverse distances comparable with the width of a Fresnel zone. An integral equation formulation is presented that can be used to obtain numerical results for most types of daytime ionospheric disturbances. Approximate solutions are given for ionospheric disturbances of the type that would occur in single-burst nuclear environments. These fullwave results are compared with results calculated from the widely used two-dimensional WKB approximation, which neglects transverse ionospheric gradients. It is shown that this WKB approximation gives good results for burst-heights above about 100 km, but that fullwave theory that accounts for transverse gradients must be used for lower burst altitudes. For these lower burst-heights, the WKB method seriously overstates the propagation anomaly caused by an on-path burst and understates the anomaly caused by an off-path burst. Author (GRA)

N78-33296# Illinois Univ. at Urbana-Champaign, Urbana.

SOURCE RADIATION IN THE PRESENCE OF SMOOTH CONVEX BODIES

S. Safavi-Naini and R. Mittra Jun. 1978 73 p refs

(Contract N00014-75-C-0293)

(AD-A056645; EM-78-3; UILU-ENG-78-2544) Avail: NTIS

HC A04/MF A01 CSCL 20/3

The problem of radiation from sources in the presence of smooth, convex, impenetrable objects is considered, and a brief survey of various high frequency techniques is presented. A generalization of the geometrical theory of diffraction and two new techniques based on the spectral domain approach and an asymptotic evaluation of radiation integral for the surface current, are also discussed. Some numerical results derived from the spectral domain formulas are presented and a comparison with available theoretical and experimental data is included. Author (GRA)

N78-33297# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.

BINARY SEQUENCES FOR SPREAD-SPECTRUM MULTIPLE-ACCESS COMMUNICATION Ph.D. Thesis

Henricus Franciscus Albertus Roefs Aug. 1977 136 p refs (Contract DAAB07-72-C-0259; Grant NSF ENG-75-22621) (AD-A056552; R-785; UILU-ENG-77-2232) Avail: NTIS HC A07/MF A01 CSCL 17/2

The communication capacity of a single wideband satellite channel can be simultaneously shared by a number of users by means of spread-spectrum multiple-access (SSMA). In phase-coded SSMA the multiple-access capability is provided by phase modulating a distinct signature sequence onto the user's carrier which spreads the user data over a wide bandwidth. All of the important code parameters for the analysis of such a system can be derived from the aperiodic correlation functions of the signature sequences. The asymptotic behavior such code parameters is considered for random binary sequences for which the sequence length grows very large. New sets of pseudo-random or m-sequences with optimal aperiodic autocorrelation and cross-correlation properties are obtained. The relationship between the first few central moments of the aperiodic correlation functions and the characteristic polynomials generating the m-sequences is analyzed and the results are compared with actual sequence data. Gauss's product of cyclotomic cosets is used to establish new analytical results on the periodic correlation properties of Gold sequences and Kasami sequences yielding subsets of sequences whose correlation parameters satisfy tighter bounds than previously established for the entire sequence sets. Numerical data on the relevant correlation parameters is obtained for a large number of good signature sequences. Author (GRA)

N78-33298# Massachusetts Inst. of Tech., Cambridge. Electronic Systems Lab.

MULTIPLE-COUPLED RANDOM ACCESS TECHNIQUES FOR PACKET RADIO NETWORKS B.S. Thesis

Lawrence Charles Siegel Jun. 1978 65 p refs (Contract N00014-75-C-1183; ARPA Order 3045) (AD-A056550; ESL-TH-824) Avail: NTIS HC A04/MF A01 CSCL 17/2

The random accessing problem for packet radio networks is considered. The contention resolving tree algorithm of Capetanakis is applied to a model in which packets are transmitted by terminals and received by repeaters, with the possibility of geometries in which more than one repeater hears a single terminal. It is shown that naive applications of the tree algorithm of this multiple-coupled random access problem lead to algorithms which deadlock. A deadlock-free algorithm, restricted-entry algorithm for the multiple-coupled random access problem, is developed. The deadlock-free property is proved. An algorithm describing how new terminals join the network is presented. Author (GRA)

N78-33299# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

IDENTIFICATION OF PERIODICALLY AMPLITUDE MODULATED TARGETS Ph.D. Thesis

Clayton Verne Stewart May 1978 137 p refs (AD-A056516; AFIT/DS/EE/78-2) Avail: NTIS HC A07/MF A01 CSCL 17/9

An algorithm that may be used for the classification of periodically amplitude modulated (PAM) targets is presented. The data base used to test the algorithm is derived from radar returns from vehicles moving at various velocities and aspect angles, but the techniques are applicable, as well, to other active wave devices such as sonar and laser. The received radar signal is considered to be a time series that is a function of target type, range, velocity, orientation, and noise. Classification is implemented in the frequency domain; short time spectra are computed using the Fast Fourier Transform (FFT). Features are extracted from the information-bearing sidebands of the resulting spectra. The radar signatures are classified using both linear discriminant and nearest neighbor classifiers, and performance is presented for two, three, five and six class cases using single and sequential looks. Probabilities of error of less than ten percent are achieved for five or fewer classes. Author (GRA)

N78-33300# RAND Corp., Santa Monica, Calif.

THE FEASIBILITY OF EMPLOYING FREQUENCIES BETWEEN 20 AND 300 GHz FOR EARTH-STATELLITE COMMUNICATIONS LINKS Interim Report

L. Mundie and N. Feldman May 1978 139 p refs Sponsored by Defense Commun. Agency (AD-A056100; RAND/R-2275/DCA) Avail: NTIS HC A07/MF A01 CSCL 17/2

This report develops a model for estimating in a new way the statistical distributions of signal attenuation, sky noise temperature, and total atmospheric-induced degradation in millimeter-wave link performance resulting from the presence of humidity, clouds, and rain in the atmosphere. The statistical distribution of system outages is then found for certain hypothetical communications links using six frequencies and four elevation angles. To illustrate the compatibility of the communications equipment with small, mobile-user platforms, pointing and tracking, weight and power, radome considerations, and antenna options are treated. It is conculded that generally acceptable performance in the millimeter-wave frequency region can be obtained both for small, mobile users and for wide-band data relay users. GRA

N78-33301# ITT Defense Communications Div., Nutley, N.J.

PHASED ARRAY ANTENNA AMPLIFIER EXPLORATORY DEVELOPMENT MODEL (100 WATTS) Semiannual Report, Jun. - Dec. 1977

P. Muscianesi, J. Irvine, J. Ranghelli, and A. Gruber Feb. 1978 75 p (Contract DAAB07-77-C-0146; DA Proj. 1L7-62701-AH-92) (AD-A056173; ECOM-77-0146-1; SAR-1) Avail: NTIS HC A04/MF A01 CSCL 09/5

The Phased Array Antenna Amplifier Exploratory Development Program will provide analysis, design and construction techniques to fabricate a scale model for a mechanically steerable phased array antenna amplifier for troposcatter communication system applications. The ultimate goal of this analysis is to determine the technical capabilities, limitations, constraints and cost feasibility for a lkw system. Implementation of this program requires analysis in two major technical areas: Matstup (Printed) antenna and solid state high power generation and combining. During this reporting period - June 1977 to December 1977 - low loss combining techniques coupled with efficient amplifier design attained 8.9 watts at 4.7 Ghz with a 1 db bandwidth covering 4.4 Ghz to 5.0 Ghz. Computer programs were generated and validated to aid in the design of the antenna dipole excitation pattern required to achieve the 30 dbi gain and 15 db sidelobes. These programs also provided the capability to analyze antenna performance degradation vs. amplitude and phase errors introduced as a result of fabrication and RF excitation. During the next reporting period, a 38 inch by 38 inch antenna array employing an amplitude taper will be fabricated and tested. Assembly and test of the basic power modules will be in progress and the IPA amplifier chain will be complete. Author (GRA)

N78-33302# Northwestern Univ., Evanston, Ill. Dept. of Mechanical Engineering and Astronautical Sciences.

TEST PARTICLE CORRELATION BY A WHISTLER WAVE IN A NONUNIFORM MAGNETIC FIELD

J. L. Vomvoridis and J. Denavit Jun. 1977 26 p refs (AD-A057065; TR-8) Avail: NTIS HC A03/MF A01 CSCL 04/1

This paper presents computer simulations of the correlation in phase of test electrons in a monochromatic whistler wave propagating along a non-uniform external magnetic field. The behavior of resonant electrons depends on an inhomgeneity ratio R, which defines the external field gradient in relation to the wave amplitude. In the case abs. val. R -1, where electron trapping

is possible, a hole (or an island) of particles is found to occur in phase plots of the distribution function. This causes the appearance of a transverse current coherent with the wave, which is most intense for abs. val. R approx. = or < 0.6. The significance of these results to magnetospheric propagation of a quasi-monochromatic whistler pulse is discussed. Author (GRA)

N78-33303# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.
HARDWARE DESIGN OF A DIGITAL SINGLE-SIDEBAND GENERATOR M.S. Thesis
Mark Howard Etzel Oct. 1977 53 p refs
(Contract DAAB07-72-C-0259; Grant NSF INT-76-84216)
(AD-A057033; R-797; UILU-ENG-77-2243) Avail: NTIS HC A04/MF A01 CSCL 17/2

Single-sideband (SSB) modulation and transmission has become increasingly important in communications systems over the past fifty years. Its success stems partially from its well-known advantages over other standard modulation techniques. These advantages include lower transmitting power for equal signal to noise ratio, the fact that no carrier is necessary for transmission, minimum bandwidth in the transmission medium is utilized, and no phase information is necessary for detecting voice signals. Author (GRA)

N78-33304# North Carolina State Univ., Raleigh.
DIGROUP DATA REDUCTION SYSTEM Phase Report
J. B. ONeal, Jr. Griffiss AFB, N. Y. RADC Jun. 1978 204 p
(Contract F30602-75-C-0118; AF Proj. 9567)
(AD-A056986; RADC-TR-78-139) Avail: NTIS HC A10/MF A01 CSCL 17/2

This report describes the design and construction of a Digroup Data Reduction (DDR) system. The DDR system compresses the bit rate of two TI PCM telephone speech carrier systems down into a 1.544 mb/sec bit stream normally occupied by one T1 carrier system. The DDR system uses a combination of Differential PCM (DPCM) and Time Assignment Speech Interpolation (TASI) to accomplish this 2:1 compression task. The report contains design details of the prototype model. The prototype was constructed using standard TTL logic. Author (GRA)

N78-33305# Army Missile Research and Development Command, Redstone Arsenal, Ala.
MIE THEORY FOR NON SPHERICAL PARTICLES
Bruce W. Fowler Jun. 1978 15 p refs
(AD-A056435) Avail: NTIS HC A02/MF A01 CSCL 20/3

In this paper, the scattering of a plane electromagnetic wave by an irregular but cylindrically symmetric dielectric particle is solved by generalizing the original work of Mie. As in the original work, the expansion coefficients of the scattered and interior (to the dielectric particle) electric and magnetic fields are obtained by satisfying the boundary conditions. Because of the particle irregularity, the expansion coefficients are coupled and form a set of linear equations that must be solved numerically. Both the integral and differential equation approaches are equivalent in analogy to the calculation of the scattering amplitude in quantum mechanics by solving either the Schrodinger or the Lippman-Schwinger equation. Further, both approaches develop into solutions of linear algebraic equations. GRA

N78-33306# Texas Technological Univ., Lubbock. Dept. of Electrical Engineering.
RADIO PROPAGATION VIA TRANSPONDER Final Report, 1 Mar. 1977 - 31 Mar. 1978
Thomas F. Trost and Paul E. Garrison May 1978 57 p refs
(Grant AF-AFOSR-3374-77)
(AD-A056899; AFOSR-78-1196TR) Avail: NTIS HC A04/MF A01 CSCL 17/2

A UHF radio propagation experiment was carried out over the south-western U.S. in July, 1977. Radio signals were relayed between ground stations located up to 500 mi. (800 km.) apart by a parachute-borne transponder. The strength of the received signals was found to be in general agreement with calculations utilizing standard atmospheric refraction. The receiving sites for the experiment employed low-noise preamplifiers and custom-made helical beam antennas as well as standard Air Force communications receiving equipment. Author (GRA)

N78-33307# Mississippi Univ., University. Dept. of Electrical Engineering.
CHARGE CONDITION AT THE JUNCTION OF UNEQUAL RADII WIRES. PART 2: CURRENT DISTRIBUTION ON THICK CYLINDRICAL STRUCTURES Final Report
Bob M. Duff Feb. 1978 55 p refs
(Grant AF-AFOSR-2862-75)
(AD-A056894; AFOSR-78-1224TR) Avail: NTIS HC A04/MF A01 CSCL 09/5

This report, which is presented in two parts, presents the results of two experimental investigations of induced currents and charges on cylindrical structures. The first part is an experimental investigation of the behavior of induced charge density at the junction of unequal radii cylinders. The second part consists of the measurement of current induced on thick cylinders and a cross composed of thick cylinders. Author (GRA)

N78-33308# Colorado Univ., Boulder. Electromagnetics Lab.
PROPAGATING MODES ON A BURIED LEAKY COAXIAL CABLE Interim Report
Steven W. Plate, David C. Chang, and Edward F. Kuester Griffiss AFB, N. Y. RADC Mar. 1978 41 p refs
(Contract F19628-77-C-0093; AF Proj. 2305)
(AD-A057253; Scientific-6; RADC-TR-78-77) Avail: NTIS HC A03/MF A01 CSCL 09/5

Characteristics of the discrete propagating modes on a buried leaky coaxial cable are investigated in this report. Provided the transfer inductance of the braid is small, three distinct propagating modes for most of the cable depths were found. The first mode has a field structure closely associated with the TEM-mode of a coaxial line and referred to as a bifilar mode because of its almost equal but opposite current on the two conductors. The second mode has a field structure located mainly outside the cable in the earth region and is referred to as a monofilar mode. The third mode which exists only for certain cable depths has a field more spread out over the air-earth interface and is referred to as a surface-attached mode. Unlike the case of an elevated wire, no degeneracy of modes is observed for parameters of practical interest. Author (GRA)

N78-33309# Yuma Proving Ground, Ariz.
INSTRUMENTATION DEVELOPMENT OF RASTER SCANNING DENSITOMETER Final Report
Leo J. Weeks Mar. 1978 19 p
(AD-A056968; YPG-339) Avail: NTIS HC A02/MF A01 CSCL 14/2

The Raster Scanning Densitometer is a digital video image densitometer/memory/processor which is a new, versatile and powerful tool for use in image processing and display tasks. The unit combines a fast analog to digital converter, a high capacity random access memory, and a high-speed arithmetic unit--all under microprocessor control--to perform a variety of digital video processing functions in real time. Among several other uses, a prime function for the Raster Scanning Densitometer will be to scan and digitize fire control system video signals for the determination of modulation transfer function. Author (GRA)

N78-33310# Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
PERFORMANCE EVALUATION OF SIMPLE HF ANTENNA SYSTEMS Interim Technical Report
C. L. Chen and W. L. Weeks Mar. 1978 73 p refs
(Contract F19628-76-C-0086)
(AD-A057255; RADC-TR-78-65; SR-2) Avail: NTIS HC A04/MF A01 CSCL 09/5

An extensive method of moments program (WF-LLL2B) has been modified to evaluate the effects of ground screen systems on the low angle radiation from vertically polarized HF antennas. Theoretical consideration was presented to justify the modification. The revised code was used to evaluate the HF antennas with ground screens of one, three and four ground wires. The low angle enhancement and front-to-back ratio of each ground screen were calculated. The influence of the height of back screen reflecting screens on the low angle radiation of broadside arrays was also studied. Author (GRA)

N78-33311# Ohio State Univ., Columbus. Electroscience Lab.

NEAR FIELD PATTERN COMPUTATIONS FOR AIRBORNE ANTENNAS Final Report, 15 Mar. 1977 - 14 Jun. 1978
W. D. Burnside, Nan Wang, and E. L. Pelton Jun. 1978 47 p refs
(Contract N00019-77-C-0299)
(AD-A057244; ESL-784685-4) Avail: NTIS HC A03/MF A01 CSCL 09/5

This report presents the results of a newly formulated analysis for computing patterns of aperture or monopole antennas mounted on the fuselage of aircraft. Approximate models of the aircraft structure are employed in conjunction with the Geometrical Theory of Diffraction to obtain the computed fields. A major feature of the analysis is that it can accommodate receiver range specifications varying from as close as a wavelength to the aircraft surface to the true far field. This feature is especially useful in that computed on-aircraft pattern performance can be compared with measurements taken at any convenient range, including the near field. Further, after such crucial checks between computations and measurements have been made, the numerical solution can be employed to accurately predict the far field performance of the on-aircraft antenna system. A general computer code, based on the new analysis has been written. The accuracy of the numerical solutions obtainable with the analysis is demonstrated by comparison with numerous model measurements. Author (GRA)

N78-33312# Army Construction Engineering Research Lab., Champaign, Ill.
ANALYSIS OF A NONLINEAR ELECTROMAGNETIC FIELD PENETRATION PROBLEM
William J. Croisant and Paul Nielson Jun. 1978 14 p ref
(AD-A056424) Avail: NTIS HC A02/MF A01 CSCL 20/3

This study examines the time-dependent penetration of a step increase in magnetic field strength H into a semi-infinite conducting medium having a permeability which varies with magnetic field strength. The medium is considered to be isotropic, homogeneous, and initially demagnetized. The medium at any point is presumed to follow its initial magnetization curve for which a simple approximation is assumed. The analytical approach consists of mathematical analysis supplemented with numerical calculations. The problem can be simplified from one involving a second order nonlinear partial differential equation to one involving a second order nonlinear ordinary differential equation utilizing a simple transformation of variables. Although a formal parametric representation of the solution of the second order differential equation is considered, a simple closed form solution in terms of elementary functions does not seem to exist. Hence several analytical techniques, as well as numerical calculations, have been employed to deduce properties of the solution. GRA

N78-33313# Arinc Research Corp., Annapolis, Md.
DESCRIPTION OF A MODEL FOR EVALUATING OPERATIONAL PERFORMANCE OF COMMUNICATIONS SYSTEM
J. E. Freedman Jun. 1978 119 p refs
(Contract DOT-FA75WA-3686)
(AD-A057199; PUBL-1319-01-4-1775) Avail: NTIS HC A06/MF A01 CSCL 17/2

This report documents on aeronautical communications operational performance model developed by ARINC Research Corporation in support of the Federal Aviation Administration's AEROSAT program. The model is operationally oriented. Its prime purpose is to serve as a tool for examining the impact of such factors as operational communications requirements and aircraft movements on the operational performance obtained by the user of a given communications system. The model has a generalized structure and is highly versatile. By judicious selection of input parameters, it can portray a wide variety of communications issues. In addition to providing a basic description of the model elements, this report reviews the background for the model's development; describes the technical scope, applications, and capabilities of the model; and presents some test runs. Author (GRA)

N78-33314# Naval Postgraduate School, Monterey, Calif.
AN INVESTIGATION OF THE POSSIBLE USES OF THE NORMAL MODE HELICAL ANTENNA IN THE TACTICAL ARMY M.S. Thesis
Michael Dean Vennum Mar. 1978 63 p refs
(AD-A056324) Avail: NTIS HC A04/MF A01 CSCL 09/5

This paper briefly discusses the need for electrically short antennas in the combat maneuver units of the modern field army. A brief history of the work done in the field of helical antennas is presented. An approximate mathematical development is presented which describes the radiation fields of the thin normal mode helical antenna. From the radiation fields, the equations for the polarization ratio and the radiation resistance are developed. A possible design for a tactical VHF-FM antenna to cover the frequency range 30-76 MHZ is presented. The design technique is discussed in detail and a calculator program for computing the input impedance is given. The results of experimental testing are presented and recommendations for improvement are given. Author (GRA)

N78-33315# Syracuse Univ., N. Y. Dept. of Electrical and Computer Engineering.
MUTUAL COUPLING ANALYSIS IN A FINITE PLANAR RECTANGULAR WAVEGUIDE ANTENNA
John Luzwick and Roger F. Harrington Jun. 1978 48 p refs
(Contract N00014-76-C-0225)
(AD-A056858; TR-78-7) Avail: NTIS HC A03/MF A01 CSCL 09/5

A solution is presented for the calculation of mutual coupling between elements in a finite planar rectangular waveguide antenna array. The aperture dimensions can be less than the feeding waveguide dimensions and the elements are uniformly spaced in each of two directions in either a rectangular or isosceles triangular lattice. The problem is formulated as an integral equation by requiring the transverse electric and magnetic fields to be continuous across the apertures. The integral equation is solved by the method of moments for the equivalent magnetic current in the aperture region. A single expansion function is used to approximate the electric field in each aperture. For apertures that are close together the normal quadruple half-space admittance integral is reduced to single integrals which are evaluated numerically. For apertures farther apart, a double numerical integral solution is used. In addition, the symmetry property of the symmetric Toeplitz admittance matrix for the linear array case and the symmetric block-Topelitz admittance matrix for the rectangular array case is utilized when solving for the unknown magnetic current coefficients. Author (GRA)

N78-33316# Stanford Univ., Calif.
SPECTRAL DISTORTION MEASURES FOR SPEECH COMPRESSION Technical Report, 1 May 1973 - 30 Apr. 1978
Y. Matsuyama, A. Buzo, and R. M. Gray Apr. 1978 65 p refs
(Contract F44620-73-C-0065; N00014-75-C-060)
(AD-A056853; SU-SEL-78-015; SU-TR-6504-3) Avail: NTIS HC A04/MF A01 CSCL 17/2

In recent years several measures of distortion between speech waveforms have been proposed as substitutes for the traditional but subjectively inadequate mean-squared error. All of these measures involve some form of distortion measure between the second order properties of the speech processes producing the waveforms instead of an average of the waveform error power. In particular, they depend on the power spectral densities or linear models of the speech process. In this report the properties and interrelations of several such measures are developed. In particular, the relative strengths or equivalences of the various implications and applications of these measures to prediction, detection, and coding are summarized. Author (GRA)

N78-33317# Mission Research Corp., Santa Barbara, Calif.
ON THE RADIATION DAMPING OF HIGH EXTERNALLY RESONANT ELECTROMAGNETIC SYSTEMS
Roger Stettner Sep. 1977 41 p refs
(Contract DNA001-77-C-0009)
(AD-A056316; AD-E300247; MRC-R-340) Avail: NTIS HC A03/MF A01 CSCL 20/14

This report addresses the question of radiation damping of resonant systems whose wavelength is larger than twice the system length. The frequencies of oscillation of such systems are also discussed. Examples, to illustrate the theory, use the

RESMOD geometry which was one of the configurations tested in the MRC Phase 4 A and B photon experiments.
Author (GRA)

N78-33318# Federal Communications Commission, Washington, D. C. Lab. Div.
RELATIONSHIP BETWEEN NOISE FIGURES AND OTHER PERFORMANCE CHARACTERISTICS OF UHF TV RECEIVERS
Lawrence C. Middlekam Apr. 1978 23 p refs
(PB-281172/7; FCC/OCE/LAB-78-02) Avail: NTIS HC A02/MF A01 CSCL 17B

There is disagreement within the television receiver 'community' as to the proper noise figure which should serve as a maximum in receiver certification. The presentation is divided into two parts: Operational noise figures of contemperary UHF-TV receivers, and UHF-TV receiver noise figures versus intermodulation as a function of changes in the operating point of the UHF tuner section. GRA

N78-33319# Cornell Univ., Ithaca, N. Y. Program on Science, Technology and Society.
COMMUNICATIONS FOR A MOBILE SOCIETY: AN ASSESSMENT OF NEW TECHNOLOGY
Raymond Bowers, Alfred M. Lee, Cary Hershey, Philip L. Bereano, Erwin A. Blackstone, Sara Edmondson, Jeffrey Frey, Kurt L. Hanslowe, Heidi Kargman, Arnim Meyburg et al 1977 526 p refs
(Grant NSF ERP-74-20555)
(PB-281639/5; NSF/RA-770354) Copyright. Avail: NTIS HC A23/MF A01 CSCL 17B

The potential is examined of land mobile communications, focusing on the 'cellular system', in which a large service area is divided into small cells, each covered by low-power transmitter receivers that can be connected to a central station by a landline or high-frequency directed electromagnetic link. Included are: (1) a review of the historical, technical and economic factors that provide the background and context for the subsequent analysis; (2) an examination of the uses of mobile communications within particular sectors of the economy, beginning with current patterns of use but extending the analysis to include changes in those patterns that might accompany deployment of new technology; (3) implications of the technology's evolution that are not restricted to particular sectors; (4) an analysis of the future structure of the industry, along with some general speculations on the future of land mobile communications and issues associated with public policy and planning; and (5) some reflections on the assessment conducted. GRA

N78-33320# Federal Communications Commission, Washington, D. C. Personal Radio Planning Group.
ALTERNATIVES FOR FUTURE PERSONAL RADIO SERVICES, VOLUME 1 Final Report
Ronald S. Stone, Mark W. Swartwout, David J. Smith, and Jim Lande May 1978 85 p 2 Vol.
(PB-280938/2) Avail: NTIS HC A05/MF A01 CSCL 17B

The evaluation of six alternatives is documented for future personal radio services. These alternatives include the CB Radio Service as it exists today and possible new services at 220 MHz or 900 MHz. The evaluation is based on five decision factors which will be important in the Commission decision process. These factors included: the time needed to implement a service change; user satisfaction and demand; economic and interference impacts to other services; cost and effectiveness of compliance and administrative procedures; and national sociological, economic and public health impacts. Information is provided on these five decision factors from ten analysis areas which included: spectrum alternatives; interference potential; service quality; equipment cost and availability; compliance and administrative procedures; user satisfaction and demand; biological effects of electromagnetic radiation; international coordination; national economic and sociological impacts; and potential acceptability. GRA

N78-33321# Federal Communications Commission, Washington, D. C. Personal Radio Planning Group.
ALTERNATIVES FOR FUTURE PERSONAL RADIO SERVICES, VOLUME 2 Final Report
Ronald S. Stone, Mark W. Swartwout, David J. Smith, and Jim Lande May 1978 219 p refs 2 Vol.
(PB-280939/0) Avail: NTIS HC A10/MF A01 CSCL 17B

Volume 2 contains the appendices to volume 1. The appendicies are as follows: The problem tree; Spectrum alternatives; Interference potential; Service quality; Equipment cost and availability; Compliance and administrative procedures; User satisfaction and demand; Biological effects of electromagnetic radiation; International coordination; National sociological and economic impacts; and, List of supplemental reports. GRA

N78-33322# National Technical Information Service, Springfield, Va.
TROPOSPHERIC SCATTER COMMUNICATIONS. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jun. 1978
William E. Reed Jul. 1978 209 p Supersedes NTIS/PS-77/0625; NTIS/PS-76/0553; NTIS/PS-75/459
(NTIS/PS-78/0718/3; NTIS/PS-77/0625; NTIS/PS-76/0553; NTIS/PS-75/459) Avail: NTIS HC $28.00/MF $28.00 CSCL 17B

The research covered data transmission, multiplexing, digital, and microwave systems and equipment. Studies on troposcatter propagation are included. Federally-sponsored research, as well as some foreign reports, are included in the citations. GRA

N78-33323# Denver Univ., Colo. Center for Social Research and Development.
ORGANIZING TO USE A NEW TELECOMMUNICATIONS TECHNOLOGY: COMMUNICATIONS SATELLITES AND VOCATIONAL REHABILITATION Final Report
John DeWitt and Ruth Katz Sep. 1977 84 p refs
(Grant SRS-22-59015)
(PB-282283/1; SRS-22-59015-001) Avail: NTIS HC A05/MF A01 CSCL 05K

The process of organizing and operating a satellite-based telecommuications project are analyzed. Four existing projects are discussed in detail. The availability of communications satellite networks for RSA usage is discussed, and recommendations are presented for RSA involvement in the evolution of satellite applications for public service uses. GRA

N78-33324# Institute for Telecommunication Sciences, Boulder, Colo.
MINIMUM ANTENNA DIMENSIONS FOR SATELLITE-COMMUNICATION EARTH STATIONS
Hiroshi Akima Apr. 1978 92 p refs
(PB-282109/8; OTR-78-145) Avail: NTIS HC A05/MF A01 CSCL 17B

Minimum antenna dimensions for various cases are calculated. Covered in the study are FM-TV, FDM-FM telephony, multiplexed PCM-PSK telephony, and PSK digital-data-signal transmission. Only the case of single signal per satellite transponder is considered. For the reception of a TV signal, a range of values for the minimum antenna dimesnion is determined. For other signals covered, sample values that correspond to assumed sizes of the system and assumed values of the satellite EIRP are calculated. GRA

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N78-33325 Auburn Univ., Ala.
EFFECTS OF EXCESS CHARGE DENSITY ON DIELECTRIC BREAKDOWN Ph.D. Thesis
Jack Miller Lloyd, Jr. 1977 227 p
Avail: Univ. Microfilms Order No. 7806087

From consideration of the available experimental evidence and an examination of the previously proposed models of electric breakdown in solid dielectrics, it appears that the model, proposed

by Budenstein, for the formation of a hot, high pressure gas channel within the dielectric prior to breakdown conduction best describes the conditions occurring during breakdown. This paper considers the manner in which the formation of such a gas within the dielectric may occur. A possible sequence of reactions in alkali halide materials was considered in relation to the gaseous model of electric breakdown. This sequence offers a mechanism for the formation of a gas within such materials. A calculation of the ground state energy of the doubly negative hydrogen molecular ion shows that this state is strongly repulsive. A localized excess charge density can cause bond disruption under the proper conditions, and lead to the formation of a gas within the dielectric. Dissert. Abstr.

N78-33326 California Univ., Berkeley.
STUDIES OF AVALANCHE INJECTION OF CHARGE INTO SiO2 USING GATED DIODE STRUCTURES Ph.D. Thesis
Robert Amentea 1977 137 p
Avail: Univ. Microfilms Order No. 7812469

New types of gated diodes were designed to obtain information concerning concerning the injection of hot carriers into silicon dioxide under avalance conditions. These devices permit one to determine many properties of the Si-SIO2 system as function of time. Information is used to generate a model for gated-diode breakdown that includes the effects of trapping of avalanche-injected charge in the oxide. The model clearly demonstrates the critical parameters of the structure.
Dissert. Abstr.

N78-33327 Stanford Univ., Calif.
THE STORAGE CORRELATOR: THEORY AND SIGNAL PROCESSING APPLICATIONS Ph.D. Thesis
Peter Gustave Borden 1978 174 p
Avail: Univ. Microfilms Order No. 78-14158

A complete analytic theory of the acousto-electric storage correlator, and experimental application which demonstrate its versatility as a signal processor is presented. A number of modes of both storing the charge pattern and reading it are reported. The theory provides analytic predictions of the device performance for most of these modes of operation and most reported device structures. Particular attention is paid to the transient characteristics of p+n diodes. A working device is demonstrated and key details of its construction are discussed. Dissert. Abstr.

N78-33328 California Univ., Berkeley.
OPTIMIZED DESIGN OF LOW-DISTORTION MONOLITHIC WIDEBAND AMPLIFIERS Ph.D. Thesis
Kam Hang Chan 1977 270 p
Avail: Univ. Microfilms Order No. 78-12513

A low-distortion monolithic wideband amplifier with a unique circuit configuration was realized after an extensive computer-aided circuit analysis. The choice of the circuit parameters was accomplished to ensure an optimized frequency response as well as minimized output distortion and noise. The final integrated circuit (IC) which was realized with a unique high-frequency bipolar process demonstrated a gain of 20 dB, with 370 MHz bandwidth. At 0 dBm signal levels, second and third-order intermodulation distortion levels were below -60 dB and -44dB respectively across the band. Terminal impedances were matched to 75 Omega with VSWR better than 1.7. Dissert. Abstr.

N78-33329 California Univ., Berkeley.
THE EFFECT OF MULTIPATH INTERFERENCE ON THE PERFORMANCE OF A DIGITAL MATCHED FILTER Ph.D. Thesis
Jin-fu Joseph Chang 1977 346 p
Avail: Univ. Microfilms Order No. 7812515

The performance of a one-bit digital matched filter (DMF) for binary signaling through a multipath channel is analyzed. Additive white Gaussian noise is the only additional channel disturbance to be considered. The output signal-to-noise ration plays a major role in the analysis, but a threshold crossing probability is also analyzed as a performance indicator. The performance of a DMF is thoroughly studied for a two-path channel, both fading and nonfading. The results for the two-path channel are derived, for any fixed signal code and also for the average code. For the general N-path Rayleigh fading channel, results are derived only for the DMF's. The possibility of improving the DMF's performance by linearly combining all available signals is also explored. Several combining techniques, adaptive and nonadaptive are proposed. Most of the results were verified by computer simulations. Dissert. Abstr.

N78-33330 Oregon State Univ., Corvallis.
A STUDY OF THE EFFECT OF THE ROTOR COIL COUPLINGS OF A SYNCHRONOUS MACHINE ON ITS PREDICTED TRANSIENT RESPONSE Ph.D. Thesis
Mohammad Hashem Nehrir 1978 108 p
Avail: Univ. Microfilms Order No. 7811990

Two linearized models of the machine are considered. In the first model, the root-locus technique of classical control theory is used as a tool to investigate the effect of mutual inductances on the short-circuit eigenvalues of the general Park model. Transfer functions for the short-circuit stator and field current responses are derived in terms of the mutual inductances. Numerical examples are presented for two (solid rotor) turbo-generators and one (salient pole) hydrogenerator unit with dampers. In the second model, the effect of the rotor coil mutual inductances on the dynamic behavior of the synchronous machine are investigated for the machine connected to an infinite-bus via a transmission line. A numerical example is given for hydrogenerator unit. Dissert. Abstr.

N78-33331 Iowa State Univ. of Science and Technology, Ames.
SPECTRAL ANALYSIS METHODS FOR NOISY SAMPLED-DATA SYSTEMS Ph.D. Thesis
Steve Forrest Russell 1978 495 p
Avail: Univ. Microfilms Order No. 7813242

The practical aspects of spectral analysis are contrasted with the mathematical theory. Treatment is limited to ergodic processes and emphasizes data window and noise effects. The Discrete Fourier Transform (DFT) and Maximum Entropy Method (MEM) are covered extensively both in theory and application with FORTRAN programs and many examples being provided. Several of the chapters are tutorial and discuss the important topics of sampling theory and system analysis. Topics on MEM include a complete calculus-of-variations solution, relationship between MEM and the Wiener-Khinchine relations, spectral resolution, and choosing the optimum order of the estimation. DFT leakage effects are modeled. A statistical significance test was developed to determine the realness of a spectral component.
Dissert. Abstr.

N78-33332 Carnegie-Mellon Univ., Pittsburgh, Pa.
AUTOMATION OF MODULE SET INDEPENDENT REGISTER-TRANSFER LEVEL DESIGN Ph.D. Thesis
Edward Alfred Snow, III 1978 203 p
Avail: Univ. Microfilms Order No. 7814233

A global optimizer which makes high-level transformations on behavioral descriptions of digital systems is described. The global optimizer operates independently of module set and design style considerations. The optimizer is presented in terms of its conceptual components: an abstract design representation which is a minimally constrained behavioral description of the digital system being designed, a set of transformations for manipulating the design representation, and a methodology for applying the transformations so as to arrive at an abstract design leading to an optimal implementation. The global optimizer is applied in several real design situations that demonstrate the optimizer's ability to produce the equivalent of good hand designs. A study of the impact of implementation tradeoffs on the performance of eight different DEC PDP-11 central processors is included.
Dissert. Abstr.

N78-33333 Arizona Univ., Tucson.
EXTENSIONS OF AHPL AND OPTIMIZATION OF THE AHPL COMPILER FOR MSI/LSI DESIGN Ph.D. Thesis
Robert Earl Swanson 1978 229 p
Avail: Univ. Microfilms Order No. 7813595

The problems associated with adapting a register transfer level hardware description language, AHPL, for design with integrated circuits are explored. Four classes of such circuits are defined with one, microprocessors, being excluded from detailed consideration. Certain common biases are discussed with primary consideration being given to compiler related ideas. A specific philosophy for designing with integrated circuits is presented

and illustrated. Various means of adapting AHPL to include integrated circuits in design are considered. A specific proposal for syntactic extension of AHPL is made using the guideline that new description techniques must grow naturally out of existing constructs. A compiler algorithm for AHPL is presented as well as one particular software implementation of it. Several examples are given. This algorithm is extended along the lines of the language proposal. Dissert. Abstr.

N78-33334 California Inst. of Tech., Pasadena.
MAGNETIC BUBBLE DOMAIN WALL DYNAMICS IN GRADIENT TRANSLATION Ph.D. Thesis
Kochan Ju 1978 170 p
Avail: Univ. Microfilms Order No. 7815965

Domain wall dynamics in magnetic bubble translation were studied. Bubble motion in the presence of a bias field gradient was investigated in detail, using high-speed sampling microscopy with 10 nanosecond laser pulse illumination. Transient bubble translation was observed and overshoot was confirmed. The stored momentum formulation was expanded. Creep was discovered and qualitative model was formulated to explain the various phases of the translational motion and the mechanism of momentum storage and release. The model was further confirmed by the transverse distortion phenomenon observed in a high impulse gradient experiment. Equations of motion for magnetic domain walls and Bloch lines are also included. Dissert. Abstr.

N78-33335 Carnegie-Mellon Univ., Pittsburgh, Pa.
PROGRAMMED-WAVEFORM PULSE-WIDTH MODULATION TECHNIQUES FOR THE CONTROL OF CONVERTER HARMONICS Ph.D. Thesis
Ira Jay Pitel 1978 179 p
Avail: Univ. Microfilms Order No. 7814231

Power converters generate harmonics which produce detrimental effects in energy delivery networks. A methodology employing Pulse-Width Modulation (PWM) is developed for optimizing a converter's input current spectrum to minimize these detrimental effects. The methodology employs a modulation technique called Programmed-Waveform (PWM) which independently defines each switching transition. Various waveform structures are possible and they are identified, analyzed, and contrasted. Objective functions, relating harmonic problems at a converter's terminals or at some point within a network to the harmonic currents injected, are identified. A numerical method is developed for minimizing these objective functions. This numerical method is applied to a computer and used to contrast the performance of optimized PWM converters to conventional converters. Dissert. Abstr.

N78-33336 South Carolina Univ., Columbia.
THE ACCELERATING NATURE OF ELECTRICAL BIAS ON MOISTURE INDUCED FAILURES OF MOS/LSI DEVICES Ph.D. Thesis
Johnston William Peeples 1978 144 p
Avail: Univ. Microfilms Order No. 7816520

Samples of plastic encapsulated n-channel MOS/LSI dynamic 4K RAMs were placed on 85 C/85% relative humidity tests at four different bias levels. Failure data representing only failures due to moisture related electrochemical corrosion of the IC aluminum metalization were analyzed. This failure mechanism accounted for 78% of the failures. Test results indicated an exponential acceleration of failure rate with increase in electrical bias level. Bias vs. median life curves allow for statements as to the moisture resistance characteristics of the packages and of the IC chips. Dissert. Abstr.

N78-33337 State Univ. of New York at Buffalo.
CURRENT VOLTAGE CHARACTERISTICS OF GALLIUM-ARSENIDE METAL EPITAXIAL SEMICONDUCTOR FIELD EFFECT TRANSISTORS AT CRYOGENIC TEMPERATURES Ph.D. Thesis
Sze-Chiu Chu 1978 175 p
Avail: Univ. Microfilms Order No. 7817020

An experimental and theoretical investigation of the current-voltage (1 sub DS-V sub DS) characteristics for GaAs MESFETS were carried out over the temperature range 7 to 300 K. The 1 sub DS-V sub DS data were obtained for both 4 microns gate and 1 microns gate MESFETs. An important observation is that the 1 sub DS-V sub DS characteristics for a GaAs MESFET for T=7 - 77 K can be determined from one set of pulsed 1 sub DS-V sub DS data at 77 K. Experimental and theoretical values for the small signal equivalent circuit parameters g sub m,sat (transconductance) and sub d (drain resistance) were also determined from the 1 sub DS-V sub DS data. Dissert. Abstr.

N78-33338*# National Aeronautics and Space Administration, Washington, D. C.
THE PRESENT SITUATION AND FORECASTS OF SEMICONDUCTOR ELEMENTS PERFORMANCE WITHIN THE MICROWAVE RANGE, 1970-1985
Bertil Peterson Oct. 1978 229 p refs Transl. into ENGLISH of "Nulage och Prognos foer FT Elements Prestanda Inom Mikrovagsomradet" Res. Inst. of Natl. Defence, Stockholm, Sept. 1971 224 p Translation was announced as N74-13483 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75453) Avail: NTIS HC A11/MF A01 CSCL 09C

The present situation and possible developments over the period 1970-1985 for active semiconductor elements in the microwave range are outlined. After a short historical survey of FT techniques, the following are discussed: Generation, power amplification, amplification of small signals, frequency conversion, detection, electronic signal control and integrated microwave circuits. Author

N78-33339*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARLY RESULTS FROM ISEE-A ELECTRIC FIELD MEASUREMENTS
J. P. Heppner, N. C. Maynard, and T. L. Aggson Jun. 1978 22 p refs
(NASA-TM-79633) Avail: NTIS HC A02/MF A01 CSCL 09C

In the solar wind and in middle latitude regions of the magnetosphere, spacecraft sheath fields obscure the ambient field under low plasma flux conditions such that valid measurements are confined to periods of moderately intense flux. Initial results show: (1) that the DC electric field is enhanced by roughly a factor of two in a narrow region at the front, increasing B, edge of the bow shock, (2) that scale lengths for large changes in E at the subsolar magnetopause are considerably shorter than scale lengths associated with the magnetic structure of the magnetopause, and (3) that the transverse distribution of B-aligned E-fields between the outer magnetosphere and ionospheric levels must be highly complex to account for the random turbulent appearance of the magnetospheric fields and the lack of corresponding time-space variations at ionospheric levels. Spike-like, non-oscillatory, fields lasting less than 0.2 seconds are occasionally seen at the bow shock and at the magnetopause and also intermittently appear in magnetosheath and plasma sheet regions under highly variable field conditions. L.S.

N78-33340*# Raytheon Co., Waltham, Mass.
SURFACE ACOUSTIC WAVE STABILIZED OSCILLATORS: ADDITIONAL AGING RESULTS Addenum to Final Report
1 Aug. 1978 7 p ref
(Contract NAS5-23701)
(NASA-CR-156833) Avail: NTIS HC A02/MF A01 CSCL 09A

Updated aging data for SAW oscillators with aluminum transducers on ST-cut quartz, for gold transducers on ST-cut quartz, and for aluminum transducers on SiO2/LiTaO3. Devices with gold transducers age differently (both and shape of curve) from those having a aluminum transducers indicating the transducer metallization can represent an important aging mechanism. A.R.H.

N78-33341*# DCA Reliability Lab., Sunnyvale, Calif. Special Products Div.
TRANSISTOR STEP STRESS TESTING PROGRAM, JANTX 2N2905A Final Report
Jun. 1978 37 p Revised
(Contract NAS8-31944)
(NASA-CR-150821) Avail: NTIS HC A03/MF A01 CSCL 09C

The effect of power and temperature stresses when applied to a variety of semiconductor devices is summarized. G.Y.

N78-33342# Mission Research Corp., La Jolla, Calif.
INTEGRATED INJECTION LOGIC (I2L). COMPARATIVE AND DESIGN TRADE-OFF EVALUATION Topical Report, May - Dec. 1976
James P. Raymond 7 Dec. 1976 67 p refs
(Contract DNA001-76-C-0201)
(AD-A056392; AD-E300268; MRC/SD-R-8; DNA-4392T) Avail: NTIS HC A04/MF A01 CSCL 09/5

Electrical parameters and radiation susceptibility of integrated injection logic (I2L) microcircuit circuit technology are reviewed. Comparisons are drawn between I2L and other contemporary LSI microcircuit technologies such as TTL, Schottky-clamped TTL, ECL, p-MOS, n-MOS, CMOS and CMOS/SOS. Performance parameters considered include cell density, switching speed, power dissipation, speed-power product, output drive capability and temperature range. Radiation effects considered are those of neutron damage, long-term ionization damage, electrical pulsed overstress damage and transient photoresponse. Trade-offs in electrical performance parameters and radiation susceptibility are suggested for 'conventional' I2L design. Critical design considerations in I2L are electrical switching response, noise margin and neutron damage susceptibility. On the other hand, I2L is of potential major advantage in the parameters of power dissipation, temperature range, long-term ionization damage susceptibility and transient photoresponse. Author (GRA)

N78-33343# Texas Instruments, Inc., Dallas.
IC FABRICATION USING ELECTRON-BEAM TECHNOLOGY Quarterly Report, 1 Sep. - Dec. 1977
Gilbert L. Varnell, Ronald A. Williamson, Terry L. Brewer, John L. Bartelt, and George A. Brown Apr. 1978 57 p
(Contract DAAB07-76-C-8105)
(AD-A056717; TI-03-78-14) Avail: NTIS HC A04/MF A01 CSCL 13/8

Continuity and integrity of electron beam resist films under device processing conditions can control the functional yield of integrated circuits fabricated using electron-beam technology. This report describes several electrical and optical evaluations of oxide pinhole density related to process induced defects in PBS and TI-313 electron resist films. Such pinholes are believed to be the cause of the zero functional yield observed on first lots of 256 bit bipolar RAM circuits fabricated with PBS resist. Results of these comparative tests indicate that the TI-313 electron resist and associated processing gives significantly better film continuity and step coverage than the PBS, being comparable to commercially available photoresist. It is thus concluded that implementation of the TI-313 electron resist technology into the process sequence already established will permit fabrication of working 256-bipolar RAM circuits in the immediate future. Author (GRA)

N78-33344# TRW Defense and Space Systems Group, Redondo Beach, Calif.
THE 9438 LOW LEVEL TRAVELING WAVE AMPLIFIER ANOMALY, REVISION A Final Report
J. A. Durschinger 7 Jun. 1978 54 p
(Contract F04701-75-C-0257)
(AD-A056714; TRW-28600-AR-016-01-Rev-A; SAMSO-TR-78-26- Rev-A) Avail: NTIS HC A04/MF A01 CSCL 09/1

The results of an investigation into an orbit failure of a LLTWTA on a DSCS-II satellite are presented. The possible causes of this failure are examined in light of orbit data and laboratory simulation testing. Author (GRA)

N78-33345# Stanford Univ., Calif. Integrated Circuits Lab.
COMPUTER AIDED ENGINEERING OF SEMICONDUCTOR INTEGRATED CIRCUITS Interim Report, 1 Nov. 1976 - 30 Apr. 1977
J. D. Meindl, K. C. Saraswat, R. W. Dutton, J. F. Gibbons, and J. D. Plummer Apr. 1978 91 p refs
(Contract DAAB07-77-C-2684; ARPA Order 2985)
(AD-A056914; ECOM-77-2684-1) Avail: NTIS HC A05/MF A01 CSCL 09/5

The objectives of this program are to remove the empiricism associated with the design and manufacturing of custom integrated circuits for military applications and to reduce the cost of these circuits by devising improved computer-aided engineering techniques. Efforts of research covered by this report are in the areas of (1) ion implantation and diffusion of dopants, (2) thermal oxidation, (3) chemical vapor deposition of silicon, and (4) device simulation and statistical circuit modeling. Author (GRA)

N78-33346# Colorado Univ., Boulder. Electromagnetics Lab.
EXCITATION OF CURRENT ON AN INFINITE HORIZONTAL WIRE OVER THE EARTH BY AN ARBITRARY ELECTRIC DIPOLE SOURCE Interim Report
Ahmed Hoorfar, Edward F. Kuester, David C. Chang, Andrew X. Smith, and Byron X. Smith Griffiss AFB, N. Y. RADC Mar. 1978 42 p refs
(Contracts F19628-77-C-0093; AF Proj. 2305)
(AD-A057257; Scientific-5; RADC-TR-78-76) Avail: NTIS HC A03/MF A01 CSCL 20/3

Excitation of propagating modes on a long horizontal wire over the earth by an arbitrary oriented dipole source is investigated. It is shown that with proper tailoring of sources, it is feasible to provide stronger excitation for either the structured-attached mode or the earth-attached mode relative to the others. In general, because the transmission-line (structured-attached) mode usually has higher attenuation in the frequency range of interest, larger percentage change in total current due to the scattering obstacles can be achieved when a smaller wire height is used. Numerical result for scattering due to dielectric obstacles modeling human bodies is included. Author (GRA)

N78-33347# Aerodyne Research, Inc., Bedford, Mass.
ANALYSIS OF ELECTRON RETARDING POTENTIAL ANALYZER MEASUREMENTS OF VEHICLE SKIN POTENTIAL IN THE PRECEDE EXPERIMENT Final Report, Jan. 1977 - Jan. 1978
Fritz Bien Jan. 1978 51 p refs
(Contract F19628-76-C-0229)
(AD-A057250; ARI-RR-118; AFGL-TR-78-0050) Avail: NTIS HC A04/MF A01 CSCL 04/1

A 2 kW electron accelerator was launched as the initial launch in the EXCEDE series of artificial auroral experiments. The launch, designated PRECEDE, was supported by a number of ground based optical systems to record the electron induced atmospheric emissions as a remote diagnostic technique of accelerator performance in addition to recording emissions of aeronomic interest in a controlled artificial aurora. The electron source, square wave modulated at 0.5 Hz, was initiated at 95 km on payload ascent and continued through apogee (120 km) to a descent altitude of approximately 80 km providing a total of 90 pulses of the 2.5kV 0.8 ampere electron beam over a period of 180 seconds. A rocketborne retarding potential analyzer provided a measure of the vehicle potential due to a net positive charge build up on the electron emitting payload. A steady-state vehicle potential of less than 30 volts was indicated at apogee with substantially smaller values at lower altitudes. Langmuir probe theory is shown to accurately model the altitude dependent steady-state vehicle potential. GRA

N78-33348# Stanford Univ., Calif.
MICROWAVE ACOUSTIC AND BULK DEVICE TECHNIQUE STUDIES Final Report, 1 Nov. 1973 - 30 Sep. 1977
Marvin Chodrow and H. J. Shaw Dec. 1977 63 p refs
(Contract F30602-74-C-0038)
(AD-A057256; GL-2748; RADC-TR-77-420) Avail: NTIS HC A04/MF A01 CSCL 09/1

The final report describes device research in both linear and nonlinear acoustic devices for signal processing. Wideband, monolithic surface-acoustic-wave convolvers have been developed, based on nonlinear interaction between surface acoustic waves and conduction electrons in zinc oxide film on sapphire structures, achieving new ranges of conversion efficiency. A high speed 8 bit analog-to-digital converter has been developed, using a heretofore unused property of linear surface acoustic wave delay lines, which has potential for multichannel parallel processing with large data throughput. Author (GRA)

N78-33349# New Mexico State Univ., Las Cruces. Physical Science Lab.
RESEARCH AND DEVELOPMENT OF ANTENNAS FOR

ROCKETS AND SATELLITES Final Report, Feb. 1975 - Jan. 1978
Alexander Waterman and Dennis G. Henry Mar. 1978 27 p refs
(Contract F19628-75-C-0072)
(AD-A056710; PR-00897; AFGL-TR-78-0095) Avail: NTIS HC A03/MF A01 CSCL 09/5

The Physical Science Laboratory, New Mexico State University has conducted research and development studies of antenna designs under contract to the Air Force Geophysics Laboratory. The studies included development of telemetry, beacon and command antennas in various frequency bands. Different mechanical configurations for rockets and satellites were investigated under direction of the contract monitor.
Author (GRA)

N78-33350# Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
ELECTRICAL CONDUCTIVITY OF SELECTED GRAPHITE INTERCALATION COMPOUNDS IN THE TEMPERATURE RANGE BETWEEN 4 AND 300 KELVIN DEGREES
Russell Eaton, III and David W. Lee Jun. 1978 15 p refs
(AD-A056429) Avail: NTIS HC A02/MF A01 CSCL 11/2

At present the only systems available for transferring electrical power from source to user are wire and cable type systems. Rapid deployment and re-deployment capabilities, ease of handling and flexibility are essential characteristics of these systems for use in today's highly mobile tactical environment. The weight of presently available cable materials is a barrier to achieving these characteristics, especially for high power systems. Recent investigations have revealed a class of compounds, known as intercalated graphite, which appear promising as new conductor materials. Intercalation compounds are compounds of lamellar host materials which have atoms or molecules of a foreign chemical species inserted between layers. Graphite intercalation compounds are presently of interest in two major areas: in selective catalysis and as synthetic metals, especially for high infrared reflectance and high electrical conductivity. In particular, it has been shown that some of these materials exhibit higher electrical conductivity and have lower density than copper. GRA

N78-33351# Georgia Inst. of Tech., Atlanta. School of Electronic Engineering.
PARAMETER ESTIMATION FOR GENERATOR SIMULATION STUDIES Final Report
R. P. Webb, C. W. Brice, O. T. Tan, and C. C. Lee Nov. 1977 148 p refs
(Contract F33615-76-C-2050; AF Proj. 3145)
(AD-A057006; AFAPL-TR-77-69) Avail: NTIS HC A07/MF A01 CSCL 09/5

This report presents a detailed study of alternator parameter estimation procedures, including comparison of theoretical results to test data and to simulation results. Author (GRA)

N78-33352# Raytheon Co., Waltham, Mass. Research Div.
COST EFFECTIVE GaAs READ IMPATT TRANSMITTERS Final Report, 29 Mar. 1976 - 31 Oct. 1977
R. N. Wallace Griffiss AFB, N. Y. RADC May 1978 187 p refs
(Contract F30602-76-C-0143; AF Proj. 4600)
(AD-A056996; S-2294; RADC-TR-78-81) Avail: NTIS HC A09/MF A01 CSCL 17/2

The objective of this program was to develop a low cost 5 GHz 40 W FM CW transmitter, using GaAs Read IMPATT diodes as RF power-generating elements, suitable for data-link applications. The transmitter actually produced during the course of the program met most of the RF performance goals established initially, but the goals for size, weight, cost, and primary power consumption were not achieved. The transmitter system was divided into four major subassemblies; a VCO-driver, a multidiode output stage, a multichannel current regulator, and a DC-to-DC inverter. The VCO-driver produced a 3.3W CW output in the 4.97 - 5.03 GHz operating band, and was capable of more than 20 MHz peak-to-peak frequency deviation with modulating frequencies between 50 kHz and 12 MHz. The output stage combined four high-power single-diode modules, operating in the injection-locked oscillator mode, through a nonresonant multiport hybrid. Compact coaxial cavity oscillator circuits were used for the diode modules. The four-port hybrid was formed by cascading two-port power splitters of the type described by Gysel. The power combining circuitry was constructed in trapped inverted microstrip (TIM) line. The transistorized multichannel current regulator permitted control of the operating bias of the output stage without excessive power dissipation. GRA

N78-33353# General Motors Corp., Goleta, Calif. Delco Electronics Div.
THE 15kW GENERAL PURPOSE POWER CONDITIONER (FREQUENCY CHANGER). AC-DC SECTION Final Report
Apr. 1978 111 p
(Contract DAAK70-77-C-0035)
(AD-A056302; R78-38) Avail: NTIS HC A06/MF A01 CSCL 10/2

This report covers effort under Contract DAAK70-77-C-0035 to further develop the ac-to-dc section or converter portion of a 15 kW general purpose power conditioner or frequency changer. Previous Delco effort under Contract DAAK02-72-C-0210 had provided a breadboard system which established the feasibility of using resonant converter concepts coupled with Delco's power center inverter for the 15 kW general purpose frequency changer. MERADCOM testing of the breadboard frequency changer revealed performance deficiencies relative to transient loading and input power line harmonic current generation. The equipment shortcomings were traced to the ac-to-dc section and led, through competitive bid, to the award of the subject contract. In implementing a new ac-to-dc converter, Delco has again relied upon resonant converters similar to the low frequency, 4-SCR resonant converter used in the early breadboard. To overcome transient performance deficiencies, the new approach uses multiple 4-SCR resonant converters operating at much higher frequencies along with more sophisticated sensing, feedback, and control circuits. In order to achieve the newly specified low levels of input power line harmonic current distortion without resorting to conventional, excessively heavy methods, Delco has relied upon a new resonant converter configuration which evolved through past internal research and development (IR and D) programs. The present concept was demonstrated and reported as part of the Delco 1977 IR and D activity and has resulted in submission of the concept for GMC patent. GRA

N78-33354# California Univ., Los Angeles. Plasma Physics Group.
EFFECT OF A dC ELECTRIC FIELD ON BEAM TRAPPING
G. J. Morales Jun. 1978 21 p refs
(Contract N00014-75-C-0476)
(AD-A056789; PPG-357) Avail: NTIS HC A02/MF A01 CSCL 20/8

In the absence of wave damping the momentum of a weak cold beam can be clamped while the wave amplitude increases secularly in time. When wave damping is present a nonlinear equilibrium is attained in which the beam evolves into a singular charge clump which drifts at constant velocity through the plasma. Author (GRA)

N78-33355# Sandia Labs., Albuquerque, N. Mex.
THERMAL DEGRADATION AND TERMINATION BEHAVIOR OF THICK FILM RESISTORS
T. V. Nordstrom Mar. 1978 34 p refs
(Contract EY-76-C-04-0789)
(SAND-77-1904) Avail: NTIS HC A03/MF A01

Thermal stability was measured for du Pont 1420, du Pont 1440, Cermalloy 540, and Cermalloy 550 thick film resistor materials. Samples were aged at 200, 300, and 400 C. In addition, effects of resistor-conductor termination area, laser trimming, and applied bias voltage on thermal stability were evaluated. For 200 and 300 C exposure, the sheet resistivity increased for all materials. Maximum increase after 5000 hours exposure was +8%. For 400 C exposure, sheet resistivity decreased for all materials. Maximum decrease was -20% for 5000 hours exposure. The termination region had no significant effect on either as-fired resistance or thermal degradation behavior. Laser trimming tended to stabilize resistors slightly and applied bias voltage had no significant effect. ERA

N78-33356# Sandia Labs., Albuquerque, N. Mex.
FLEXIBLE SYSTEM HAVING TWO SELECTABLE RATIOS

FOR USE WITH JOSEPHSON VOLTAGE DEVICES WITH 2 SELECTABLE RATIOS
David W. Braudaway 1977 12 p refs Presented at the Conf. on Precision Electromagnetic Meas., Ottawa, 26 Jun. 1978
(Contract EY-76-C-04-0789)
(SAND-77-2121C; Conf-780610-1) Avail: NTIS HC A02/MF A01

A system is described for using Josephson devices in maintaining a voltage standard. This system offers selectable ratios of 100:1 and 200:1, is designed to be used in several modes of operation, and aids ratio establishment by conventional techniques. ERA

N78-33357# Sandia Labs., Albuquerque, N. Mex. Passive Components Div.
MEASUREMENTS OF DIMENSIONAL AND ELECTRICAL CHARACTERISTICS OF PRINTED BOARDS MADE WITH IPC MULTI-PURPOSE TEST PATTERN, B-25
Charles W. Jennings 1978 40 p refs Presented at the 1st Printed Circuit World Conv., London, 5 Jun. 1978
(Contract EY-76-C-04-0789)
(SAND-77-1837C; Conf-780604-1) Avail: NTIS HC A03/MF A01

Printed boards fabricated at four suppliers with Multi-Purpose Test Pattern B-25 are compared. Two suppliers used panel plating and two pattern plating in board fabrication. Bare as well as solder mask coated boards are compared. Average deviations of conductor widths from design widths ranged from -0.010 to -0.038 mm on phototools and -0.061 to 0.041 mm on boards. The deviations depended mainly on fabrication period and source. Copper thicknesses obtained from resistance measurements, ranging from 0.056 to 0.079 mm were within 5 percent of those obtained from beta backscatter and cross section measurements. Breakdown voltages between conductor separations of 0.08 to 0.76 mm were roughly 70 percent of those for the Paschen curve for air in a quasi uniform electric field (spherical electrodes). ERA

N78-33358# Sandia Labs., Livermore, Calif. Model Labs Div.
DATA ACQUISITION SYSTEMS APPLIED TO PRINTED-WIRING-BOARD MEASUREMENTS
A. D. Andrade Mar. 1978 24 p
(Contract EY-76-C-04-0789)
(SAND-78-8501) Avail: NTIS HC A02/MF A01

Data acquisition systems in use for quality control are described. Three types of system are in service: interactive, microprocessor-based, and calculator-based. Software programs for the latter two can be written to suit particular needs. The software programs used include those for copper surface and copper etched pattern thickness measurements and the associated error analysis. Data acquisition systems can in principle be adapted to any existing measurement system. The advantages incurred are that data are accumulated and analysis (if required) is done in a single operation started with a bottom. Thus time and labor are saved and both transcription and calculational errors are eliminated. ERA

N78-33359# Argonne National Lab., Ill.
SUPERCONDUCTING TRANSISTOR
K. E. Gray 1978 7 p refs Presented at Conf. on Future Trends in Superconductive Electronics, Charlottesville, Va., 23 Mar. 1978
(Contract W-31-109-eng-38)
(Conf-780339-1) Avail: NTIS HC A02/MF A01

A three film superconducting tunneling device, analogous to a semiconductor transistor, is presented, including a theoretical description and experimental results showing a current gain of four. Much larger current gains are shown to be feasible. Such a development is particularly interesting because of its novelty and the striking analogies with the semiconductor junction transistor. ERA

N78-33360# National Bureau of Standards, Washington, D. C.
MEASUREMENT TECHNIQUES FOR HIGH POWER SEMICONDUCTOR MATERIALS AND DEVICES Annual Report, 1 Jan. - 31 Dec. 1977
May 1978 84 p refs
(ARPA Order 2397)
(PB-281723/7; NBSIR-78-1474) Avail: NTIS HC A05/MF A01 CSCL 09A

The NBS activities directed toward the development of measurement methods for semiconductor materials are described. The major tasks under this project were: (1) to evaluate the feasibility of the photovoltaic method as a rapid, nondestructive technique for characterizing the resistivity uniformity of high-resistivity, large-diameter silicon wafers, (2) to evaluate the use of thermally stimulated current and capacitance measurements and other deep level measurement techniques as a means for characterizing lifetime controlling or leakage source defects in power grade silicon material and devices, and (3) to develop procedures to enable spreading resistance measurements of thyristor starting material and layer profiles to be made on a reliable basis. GRA

N78-33361# National Technical Information Service, Springfield, Va.
COMPUTER AIDED DESIGN OF MICROCIRCUITS. CITATIONS FROM THE ENGINEERING DATA BASE Progress Report, 1970 - Jul. 1978
William E. Reed Aug. 1978 209 p Supersedes NTIS/PS-77/0712
(NTIS/PS-78/0822/3; NTIS/PS-77/0712) Avail: NTIS HC $28.00/MF $28.00 CSCL 09E

Worldwide research reports covering the computer aided design, modeling, layout, and packaging of integrated and other microelectronic circuits are cited. Computer programs and the use of computer graphics are included. This updated bibliography contains 203 abstracts, 27 of which are new entries to the previous edition. GRA

N78-33362# National Technical Information Service, Springfield, Va.
LIGHT EMITTING DIODES, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Jun. 1976 - Jun. 1978
William E. Reed Jul. 1978 155 p Supersedes NTIS/PS-77/0599; NTIS/PS-76/0532; NTIS/PS-75/415; COM-73-11797
(NTIS/PS-78/0736/5; NTIS/PS-77/0599; NTIS/PS-76/0532; NTIS/PS-75/415; COM-73-11797) Avail: NTIS HC $28.00/MF $28.00 CSCL 09A

Studies on electroluminescent and semiconductor lasers are presented in the bibliography. Theory, design, applications, and materials are covered with applications including displays, optical communications, laser illuminators, signal processing, and avionics. This updated bibliography contains 148 abstracts, 61 of which are new entries to the previous edition. GRA

N78-33363# National Technical Information Service, Springfield, Va.
FERRITE MICROWAVE ELECTRONICS, VOLUME 3. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Jun. 1976 - Jun. 1978
William E. Reed Jul. 1978 155 p Supersedes NTIS/PS-77/0593; NTIS/PS-76/0520; NTIS/PS-75/458
(NTIS/PS-78/0738/1; NTIS/PS-77/0593; NTIS/PS-76/0520; NTIS/PS-75/458) Avail: NTIS HC $28.00/MF $28.00 CSCL 09A

The areas researched are: single crystals, thin films, dielectrics, semiconductor devices, integrated circuits, phase shifters, and waveguide components. Studies on the microwave properties of ferrites are included. This updated bibliography contains 149 abstracts, 33 of which are new entries to the previous edition. GRA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N78-33364 Minnesota Univ., Minneapolis.
THE MORPHOLOGY AND STABILITY OF MATERIAL PHASES Ph.D. Thesis
John Ernest Dunn, III 1978 197 p
Avail: Univ. Microfilms Order No. 78-3391

Gibbs' concept of the 'thermostatic stability' of a fluid state is given a precise field theoretic formulation, and necessary and sufficient conditions are found for the existence and uniqueness of such states. The attribution of stability to such states is then partially validated by showing that certain of these states enjoy a thermodynamic stability with respect to certain collections of what we call neo-classical processes. Corollaries of the above-mentioned results serve to highlight certain inadequacies and/or errors in the usual presentations of the Phase Rule.
Dissert. Abstr.

N78-33365 Michigan Univ., Ann Arbor.
STREAMING BIREFRINGENCE IN EXTENSIONAL FLOW OF POLYMER SOLUTIONS Ph.D. Thesis
William Haeseler Talbott 1978 219 p
Avail: Univ. Microfilms Order No. 7813745

The rheological stress-optical relations of simple fluids for extensional and shearing motion are reviewed. Only tensile stress and birefringence are necessary to determine the stress-optical relations for this motion. The stress-optical predictions of two microrheological theories are reviewed. An experimental system to measure the birefringence in fluid filaments in the spinning motion in a well-controlled experiment was designed, constructed, and tested. An extensive analysis of the measuring system is provided which demonstrates the validity of the measurement. The fluids studied are 1 1/2% and 2 1/2% solutions of two polyacrylamides in a 1:1 water-glycerol mixture and a 5% solution of polystyrene in a polychlorinated biphenol. For all fluids, the birefringence in extension depends in a nonlinear fashion on the stress.
Dissert. Abstr.

N78-33366 Texas A&M Univ., College Station.
NUMERICAL SIMULATION OF TWO-PHASE FLOW IN VERTICAL PIPES Ph.D. Thesis
Dimabo Boyton Akuiyibo 1978 155 p
Avail: Univ. Microfilms Order No. 7817161

The development and application of a one-dimensional fully implicit numerical model for simulating the transient and equilibrium conditions of a flowing oil/gas well is described. Different flow patterns from bubble to mist flow are simulated including liquid build-up, start-up or shut-in of a producing well. Pseudorelative permeability-data are used to replace the flow regime map used in the correlation methods. The insitu foam densities are found to be velocity dependent when liquid is entrained as dispersed droplets in the gas phase. The densities are also saturation dependent when gas is entrained as dispersed bubbles in the liquid phase. By coupling the tubing model to a one-cell depletion type gas reservoir, fluid flow problems from the reservoir into the tubing and the sequential liquid build-up in the tubing up to the cessation of flow and subsequent unloading of the well can be monitored.
Dissert. Abstr.

N78-33367 Polytechnic Inst. of New York.
FORCED FLOW LAMINAR FILMWISE CONDENSATION OF A PURE SATURATED VAPOR IN A VERTICAL TUBE Ph.D. Thesis
Flavio Dobran 1978 163 p
Avail: Univ. Microfilms Order No. 7816746

Equations and boundary conditions governing the condensation process have been examined in detail in order to determine relevant parameters of the problem. For a wide range of conditions, it is found that the condensation process is governed by five parameters. These are the ratio of vapor Froude to Reynolds number, buoyancy number, vapor to liquid viscosity ratio, liquid Prandtl number and subcooling number. The resulting set of partial differential equations of the boundary layer type is transformed to three first order ordinary differential equations by means of an integral analysis. The set describes the distribution of liquid film thickness, condensate mass flow rate and interphase mass transfer as a function of the distance along the tube. Solution of the reduced set of coupled, non-linear and stiff equations is accomplished by a computer code for wide range of arbitrary parameters.
Dissert. Abstr.

N78-33368 North Carolina State Univ. at Raleigh
AN INVESTIGATION OF PHASE CHANGE PROBLEMS. A: MELTING OF A SEMI-TRANSPARENT MEDIUM INCLUDING RADIATION EFFECTS. B: TRANSIENT FREEZING OF TURBULENT FLOW INSIDE TUBES Ph.D. Thesis
Chul Cho 1978 109 p
Avail: Univ. Microfilms Order No. 7811615

The effects are studied of radiation on the melting rate of an absorbing, emitting, scattering, semi-transparent, homogeneous medium having a geometry in the form of a semi-infinite region, hollow cylinder and hollow sphere. The boundaries are assumed to absorb, emit and reflect radiation. The problem of phase change for the semi-infinite medium is solved by the zeroth order analysis of the generalized integram transform technique; the problems of hollow cylinder and hollow sphere are solved by the regular perturbation technique. The radiation effects are included by the application of the P sub 1 approximation of the spherical harmonics method. The transient freezing of liquids in unsteady turbulent flow inside circular tubes is investigated. The profile of the liquid-solid interface and the local transient heat flux are determined as a function of time at different locations along the tube for different values of the system parameters.
Dissert. Abstr.

N78-33369 New Jersey Inst. of Technology, Newark.
DEPOSITION OF SUSPENSIONS IN LAMINAR FLOW IN THE ENTRANCE REGION OF CHANNELS WITH DIFFUSIVE, ELECTROSTATIC AND GRAVITATIONAL EFFECTS Ph.D. Thesis
Thomas Anthony Korjack 1978 183 p
Avail: Univ. Microfilms Order No. 78-15894

The fluid phase was assumed to be incompressible, steady and laminar; the particle phase was assumed to be steady, laminar, dilute, and with negligible lift force. The complete solution of the problem involved solving the boundary layer equations for the completely viscous fluid phase, and the particulate momentum, continuity and potential equations for the particle phase. Since the resulting equations are non-linear partial differential equations, numerical techniques were utilized to obtain solutions. The flow characteristics of the particulate phase along with the deposition rate of the solid particles were investigated under varied flow conditions. Deposition due to surface adhesion, gravity and electrostatic charge was considered.
Dissert. Abstr.

N78-33370 Catholic Univ. of America, Washington, D. C.
A NUMERICAL STUDY OF UPSTREAM BLOCKING AND INTERNAL WAVES IN A DENSITY STRATIFIED FLUID Ph.D. Thesis
Chang-Yang Li 1978 161 p
Avail: Univ. Microfilms Order No. 78-14517

The flow is assumed to be laminar, viscous, incompressible, diffusive and bounded. Full Navier-Stokes and diffusion equations are used. A non-linear initial boundary-value problem is introduced and solved numerically. Two types of obstacles are studied, namely, source-like half body and dipole-like closed body. Both linear stratification and sharp changed density stratification are studied. Comparisons between hydrostatic and non-hydrostatic flows are made. Various Froude numbers, Reynolds numbers, obstacle heights and density transitions levels are used. Velocity profiles, wave speeds, wave lengths, jump heights are obtained and compared with previous theories and experiments by various investigators. Downstream waves and lee wakes are also observed.
Dissert. Abstr.

N78-33371 Oklahoma Univ., Norman.
A PHOTOGRAPHIC TECHNIQUE TO OBTAIN DROPLET AND FLOW PATTERN DATA IN TWO-PHASE FLOW FOR USE IN MODELING Ph.D. Thesis
Robert Dean Lindsted 1977 274 p
Avail: Univ. Microfilms Order No. 7815369

Photographic data was taken to record size, number, shape and distribution of droplets as well as the thickness of the liquid layer on the wall of the tube over a wide range of qualities and gas flow rates. Photographic data from this study shows an exchange between the liquid in the film on the wall and the

droplets in the core region. This resulted in considering a geometrical blockage factor calculated from the blockage due to tips of the waves and the droplets in the gas core region. A mass blockage factor based on the ratio of the mass flow of gas in the core to the total mass flow in the core was also considered. The mass blockage factor took into account the velocity and density as well as the area of each phase. Several different velocity profile models were solved based on separated flow. Mass blockage factors based on these velocity profiles were calculated and used to modify interfacial shear stresses and maximum velocity values. These modified values were found to be in closer agreement with other models and experimental results than the values obtained without considering the liquid entrainment in the core region through the mass blockage factor. Dissert. Abstr.

N78-33372 California Univ., San Diego.
A PERTURBATION ANALYSIS OF THE STEADY INTEGRAL FLOW AND HEAT TRANSPORT OF GASES IN ROD BUNDLES, PART 1. ASYMPTOTIC ANALYSIS OF PLANE TURBULENT COUETTE-POISEUILLE FLOWS, PART 2 Ph.D. Thesis
Kurt Offerrall Lund 1978 168 p
Avail: Univ. Microfilms Order No. 78-16765

The basic field equations for flow and heat transport are made dimensionless, or scaled, according to the characteristic conditions of current gas-cooled rod bundle design. Through the use of an integral theorem over subdivision of the flow field, called subchannels, subchannel equations were obtained from the scaled field equations. The scaled subchannel equations include two small parameters which uncouple the energy equation from the momentum and continuity equations and which show that the pressures in all subchannels are equal except in the vicinity of singularities caused by rod spacing structures (spacers). Solutions to the scaled subchannel equations were derived in terms of perturbation series in the two small parameters. Dissert. Abstr.

N78-33373 Kentucky Univ., Lexington.
NATURAL CONVECTION IN A THERMALLY STRATIFIED FLUID Ph.D. Thesis
Chiu-Chao Chen 1977 213 p
Avail: Univ. Microfilms Order No. 78-15731

The effect of thermally stratified environments on natural convection was investigated analytically and experimentally. The physical model considered is an isothermal finite body immersed in an unbounded fluid. The temperature distribution of the fluids far from body surface is stably thermally stratified. The boundary layer concepts and the Boussinesq's approximation were applied in deriving the governing equations. An important dimensionless group which indicates the steepness of the ambient fluid stratification was found. Dissert. Abstr.

N78-33374 Stanford Univ., Calif.
TRANSIENT FLOW OF NON-NEWTONIAN POWER-LAW FLUIDS IN POROUS MEDIA Ph.D. Thesis
Chinyere Ukeagumo Ikoku 1978 274 p
Avail: Univ. Microfilms Order No. 7814179

A nonlinear partial differential equation for flow of power-law fluids was derived. The diffusivity equation is a special case of this new equation. The partial differential equation describes the flow of a slightly compressible, non-Newtonian power-law fluid in a homogeneous and isotropic porous medium. This equation should govern the flow of most non-Newtonian oil displacement agents used in enhanced oil recovery projects, e.g., polymer solutions and micellar solutions. A linear form of the partial differential equation was also derived. A model for the flow of foam in porous media gave rise to another nonlinear partial differential equation which considers the compressibility of foam, and the pressure-dependent quality of foam. The quality of foam is the ratio of gaseous volume to total foam volume. Analytical solutions of the transient and steady-state forms of the linear partial differential equation were obtained. Dissert. Abstr.

N78-33375 California Inst. of Tech., Pasadena.
ANALYTICAL STUDIES OF STEADY AND NON-STEADY MOTIONS OF A BUBBLY LIQUID Ph.D. Thesis
William Allan Symington 1978 145 p
Avail: Univ. Microfilms Order No. 7816958

A consistent set of continuum-like equations which describe, under certain limitations, the flow of bubbly gas-liquid mixtures is developed. These equations are then applied in the solution of few problems that bear on technological issues of nuclear reactor safety. The solutions of these problems illustrate the importance of the ratio between the viscous relaxation time of the bubbles and the characteristic time of the flow, in scaling experimental results. The choked flow of a bubbly mixture through a contraction in a one dimensional duct is treated. The rise through a liquid of a uniform cloud of bubbles is also analyzed. Self-preserving wave solutions of the nonlinear equations are found to exist. The flow of a bubbly mixture over a wavy wall is analyzed. Dissert. Abstr.

N78-33376 George Washington Univ., Washington, D. C.
VISCOUS ENTRAINMENT OF MASS AND ENERGY IN FLUID DYNAMIC ENERGY SEPARATION Ph.D. Thesis
David Richard Sobel 1978 131 p
Avail: Univ. Microfilms Order No. 7815685

A two-dimensional jet upon impingement on a wall will bifurcate into two streams having different energy levels if the jet source is moving parallel to the impingement surface. This study deals with the viscous interaction between the jet and the translating impingement surface, and with the effects of this interaction on the performance of the Energy Separator. The analysis covers primarily the flow region corresponding to the high energy stream in which there exists a boundary layer with two predominant flow directions. Dissert. Abstr.

N78-33377 Kentucky Univ., Lexington.
MEASUREMENT AND ANALYSIS OF FLOW IN DUCTS AND ROD BUNDLES Ph.D. Thesis
Sudhakar Neti 1977 208 p
Avail: Univ. Microfilms Order No. 7815759

Turbulent flow measurements were made in the subchannels of a nine rod square pitch rod bundle. A two-component dual beam laser Doppler velocimeter with polarized beams and frequency shift was developed for this purpose. Measured mean vertical velocities normalized with the bulk velocity had peak values of 1.45, 1.39 and 1.35 at Reynolds numbers of 10,000, 20,000 and 40,000, respectively. Vertical turbulence intensities close to the walls were 12 percent to 20 percent while minimum values of vertical turbulence were a little over 5 percent. The mean horizontal velocities measured were about 1 percent of the bulk velocity and suggest the existence of eight secondary flow loops in a subchannel. The horizontal turbulence intensities varied from 3.5 percent to 5 percent. The maximum values occur near walls and subchannel centers. The measured Reynolds stresses were found to be about half the expected values. Dissert. Abstr.

N78-33378 Washington Univ., Seattle.
STABILITY OF SPARINGLY SOLUBLE MONOLAYERS AT THE AIR-WATER INTERFACE Ph.D. Thesis
Richard Doyle Smith 1977 316 p
Avail: Univ. Microfilms Order No. 7814495

The stability of sparingly soluble monolayers was studied using a modified Langmuir-Adam-Whilhelmy surface balance to monitor total monolayer area as a function of time at constant surface pressure (20 C). All condensed monolayers except those of DPL are found to have a characteristic critical surface pressure above which they are metastable with respect to bulk phase formation (collapse). At moderate surface pressures in excess of the critical value the collapse process is orderly and reproducible, the rate increasing with both surface pressure and time. A general model of dynamic monolayer behavior was developed to describe all relevant modes of monolayer loss including dissolution, evaporation, intrinsic film rheology and surface phase changes as well as collapse to bulk surfactant. Dissert. Abstr.

N78-33379*# TRW Defense and Space Systems Group, Redondo Beach, Calif.
EXTENDED DEVELOPMENT OF VARIABLE CONDUCTANCE HEAT PIPES Final Report
D. Antoniuk, D. K. Edwards, and E. E. Luedke Sep. 1978 56 p

(Contract NAS2-9834)
(NASA-CR-152183; TRW-31183-6001-RU-00) Avail: NTIS HC A04/MF A01 CSCL 20D

A high-capacity vapor-modulated heat pipe was designed and tested. In 1977, a program was undertaken to use the aforementioned heat pipe to study protection from freezing-point failure, increase control sensitivity, and transient behavior under a wide range of operating conditions in order to determine the full performance potential of the heat pipe. A new concept, based on the vapor-induced-dry-out principle, was developed for passive feedback temperature control as a heat pipe diode. This report documents this work and describes: (1) the experimental and theoretical investigation of the performance of the vapor-modulated heat pipe; and (2) the design, fabrication and test of the heat pipe diode. G.Y.

N78-33380*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ENGINEERING IN THE 21ST CENTURY
John F. McCarthy, Jr. 1978 15 p refs Presented at the 25th Anniv. Conf. of the Am. Astronautical Soc., Houston, Tex., 30 Oct. 1978 - 2 Nov. 1978
(NASA-TM-79010; E-9714) Avail: NTIS HC A02/MF A01 CSCL 12B

Reasonable evolutionary trends in federal outlays for aerospace research and development predict a continuing decline in real resources (1970 dollars) until the mid eighties, and a growth thereafter to the 1970 level by 2000, still well below the 1966 peak. Employment levels will parallel this trend with no shortage of available personnel foreseen. These trends characterize a maturing industry. Shifts in outlook toward the economic use of resources, rather than minimum risk at any cost, and toward missions aligned with societal needs and broad national goals will accompany these trends. These shifts in outlook will arise in part in academia, and will, in turn, influence engineering education. By 2000, space technology will have achieved major advances in the management of information, in space transportation, in space structures, and in energy. The economics of space systems must be the primary consideration if the space program foreseen for the 21st century is to become an actuality. Author

N78-33381*# Cornell Univ., Ithaca, N. Y. Lab. of Atomic and Solid State Physics and Materials Science Center.
A MEAN SPHERICAL MODEL FOR SOFT POTENTIALS: THE HARD CORE REVEALED AS A PERTURBATION
Yaakov Rosenfeld and N. W. Ashcroft [1978] 23 p refs Sponsored in part by Chaim Weizmann Found.
(Grants NGR-33-010-188; NSF DMR-76-81083)
(NASA-CR-157771; TR-4009) Avail: NTIS HC A02/MF A01 CSCL 20D

The mean spherical approximation for fluids is extended to treat the case of dense systems interacting via soft-potentials. The extension takes the form of a generalized statement concerning the behavior of the direct correlation function c(r) and radial distribution g(r). From a detailed analysis that views the hard core portion of a potential as a perturbation on the whole, a specific model is proposed which possesses analytic solutions for both Coulomb and Yukawa potentials, in addition to certain other remarkable properties. A variational principle for the model leads to a relatively simple method for obtaining numerical solutions. Author

N78-33382*# Polytechnic Inst. of New York, Farmingdale. Dept. of Mechanical and Aerospace Engineering.
AN OLD INTEGRATION SCHEME FOR COMPRESSIBLE FLOWS REVISITED, REFURBISHED AND PUT TO WORK Scientific Interim Report
Gino Moretti Sep. 1978 36 p refs
(Grant NsG-1248; Contract N00014-75-C-0511; Grant DAAG29-77-G-0072; NR Proj. 061-135; Proj. P14369-E)
(NASA-CR-15775; POLY-M/AE-78-22) Avail: NTIS HC A03/MF A01 CSCL 20D

A scheme for integrating the Euler equations of compressible flow in any hyperbolic case is presented. The scheme relies on the concept of characteristics but is strictly a finite difference scheme. Improvements in accuracy and physical consistence due to the scheme are discussed and results of its application to complex flows are shown. Author

N78-33383*# Athens Coll., Ala.
VAPOR TRANSPORT MECHANISMS Final Report
Gary L. Workman 7 Aug. 1978 37 p refs
(Contract NAS8-31731)
(NASA-CR-150824) Avail: NTIS HC A03/MF A01 CSCL 20D

The Raman scattering furnace for investigating vapor transport mechanisms was completed and checked out. Preliminary experiments demonstate that a temperature resolution of plus and minus 5 C is possible with this system operating in a backscatter mode. In the experiments presented with the GeI 4 plus excess Ge system at temperatures up to 600 C, only the GeI4 band at 150 cm superscript minus 1 was observed. Further experiments are in progress to determine if GeI2 does become the major vapor species above 440 C. Author

N78-33384*# Rockwell International Corp., Downey, Calif. Satellite Systems Div.
DEVELOPMENT OF A CRYOGENIC ROTATING HEAT PIPE JOINT Final Report, Nov. 1977 - Sep. 1978
Sep. 1978 72 p refs
(Contract NAS2-9726)
(NASA-CR-152188; SD-78-AP-0124) Avail: NTIS HC A04/MF A01 CSCL 20D

The performance of two critical technology components required for a continuously rotatable heat pipe: (1) a low-leakage rotatable coupling for the heat pipe pressure vessel, and (2) a rotatable internal wick, is reported. Performance and leakage requirements were established based on 12 months operation of a cryogenic rotatable heat pipe on a satellite in earth orbit. G.Y.

N78-33385*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DIRECT MEASUREMENTS AND ANALYSIS OF SKIN FRICTION AND COOLING DOWNSTREAM OF MULTIPLE FLUSH-SLOT INJECTION INTO A TURBULENT MACH 6 BOUNDARY LAYER
Floyd G. Howard and Andrew J. Strokowski Oct. 1978 112 p refs
(NASA-TP-1176; L-11950) Avail: NTIS HC A06/MF A01 CSCL 20D

Experiments were conducted to determine the reduction in surface skin friction and the effectiveness of surface cooling downstream of one to four successive flush slots injecting cold air at an angle of 10 deg into a turbulent Mach 6 boundary layer. Data were obtained by direct measurement of surface shear and equilibrium temperatures, respectively. Increasing the number of slots decreased the skin friction, but the incremental improvement in skin-friction reduction decreased as the number of slots was increased. Cooling effectiveness was found to improve, for a given total mass injection, as the number of slots was increased from one to four. Comparison with previously reported step-slot data, however, indicated that step slots with tangential injection are more effective for both reducing skin friction and cooling than the present flush-slot configuration. Finite-difference predictions are in reasonable agreement with skin-friction data and with boundary-layer profile data. Author

N78-33386*# Colorado State Univ., Fort Collins. Fluid Mechanics and Wind Engineering Program.
A VISUAL INVESTIGATION OF TURBULENCE IN STAGNATION FLOW ABOUT A CIRCULAR CYLINDER Final Report
Willy Z. Sadeh and Hervert J. Brauer Oct. 1978 62 p refs Film supplement Number C-288 to this report is available on loan from Chief Management Services Division (5-5). National Aeronautics and Space Administration. Lewis Research Center, 2100 Brookpark Road, Cleveland, Ohio 44135
(Grant NsG-3127)
(NASA-CR-3019; CSU-FMWEP-NASLRC-1; CER-77-78WZS-HG1322) Avail: NTIS HC A04/MF A01 CSCL 20D

A visual investigation of turbulence in stagnation flow around a circular cylinder was carried out in order to gain a physical insight into the model advocated by the corticity-amplification theory. Motion pictures were taken from three different viewpoints, and a frame by frame examination of selected movie strips was

conducted. Qualitative and quantitative analyses of the flow events focused on tracing the temporal and spatial evolution of a cross-vortex tube outlined by the entrained smoke filaments. The visualization supplied evidence verifying: (1) the selective stretching of cross-vortex tubes which is responsible for the amplification of cross vorticity and, hence, of streamwise turbulence; (2) the streamwise tilting of stretched cross-vortex tubes; (3) the existence of a coherent array of vortices near the stagnation zone; (4) the interaction of the amplified vorticity with the body laminar boundary layer; and, (5) the growth of a turbulent boundary layer. Author

N78-33387*# Pennsylvania State Univ., University Park. Applied Research Lab.

THE CALIBRATION AND APPLICATION OF FIVE-HOLE PROBES

A. L. Treaster and A. M. Yocum 18 Jan. 1978 57 p refs
(Grant NsG-3031; Contract N00017-73-C-1418)
(NASA-CR-157735; AD-A055870; TM-78-10) Avail: NTIS HC A04/MF A01 CSCL 14/2

In many complex flow fields such as those encountered in turbomachines, the experimental determination of the steady-state, three-dimensional characteristics of the flow field are frequently required. If space limitations or other considerations make nulling techniques impractical, five-hole probles in a non-nulling mode can be employed. However, this application requires complete three-dimensional calibration data which are not usually supplied by commercial vendors. Presented in this paper are the results of programs to calibrate and employ five-hole probes of both angle-tube and prismatic geometries. Included are descriptions of the calibration technique, typical calibration data, and an accompanying discussion of the application or interpolation procedure. Also documented are the variations in the calibration data due to Reynolds number and wall proximity effects. Typical measured data are included and, where applicable, these data are validated by comparison with data obtained using other types of velocity measuring instrumentation. Author (GRA)

N78-33388# Pennsylvania State Univ., State College. Applied Research Lab.

AN APPROXIMATE METHOD FOR CALCULATING THE MEAN STREAMLINES OF THE DIRECT PROBLEM OF AN OPEN ROTOR

M. L. Billet 11 May 1978 63 p refs
(Contract N00017-73-C-1418)
(AD-A057151; ARL/PSU/TM-78-161) Avail: NTIS HC A04/MF A01 CSCL 20/4

As part of a program to analyze secondary flows in a rotor, an approximate method was utilized to obtain the mean streamlines through the rotor. The mean streamlines were calculated by means of an iterative procedure which simultaneously satisfies the principles of conservation of energy, momentum and continuity for incompressible flow. The procedure used to calculate the flow mean streamlines is a version of the streamline curvature method. For the direct method, it is necessary to determine the outlet flow angles for the rotor blade sections. This angle is a combination of the metal blade angle and a deviation angle. An approximate method for calculating this deviation angle is described which is based on available experimental data. A good correlation between predicted data and experimental measurements has been obtained using this direct analysis method for the mean streamlines. Author (GRA)

N78-33389# Utah Univ., Salt Lake City. Dept. of Chemistry.

RAYLEIGH-BRILLOUIN SCATTERING AND STRUCTURAL RELAXATION OF A VISCOELASTIC LIQUID

Y.-H. Lin and C. H. Wang 1 Jul. 1978 38 p refs
(Contract N00014-75-C-0908)
(AD-A056763; TR-19) Avail: NTIS HC A03/MF A01 CSCL 20/4

The linear response theory using a complete set of dynamic variables involving density, velocity and energy fluctuations is used to analyze the Rayleigh-Brillouin spectrum of a viscoelastic liquid. An exact equation including the effect of structural relaxation has been obtained. The result is discussed in the fast and slow relaxation limits. In the former case, the Rayleigh-Brillouin spectrum is identical to that predicted by the classical hydrodynamic equations, whereas in the latter case a new structural central peak is found, in addition to the anomalous dispersion and relaxation effects present in the frequency and linewidth data associated with the Brillouin peak. The evolution of structural relaxation and its effect on the entire Rayleigh-Brillouin spectrum is described. The structural central peak is most pronounced with the frequency dispersion and the linewidth maximum are present. The theoretical result has been used to calculate the Rayleigh-Brillouin spectra of polypropylene glycol at various temperatures. The results of the frequency shift, the spectral linewidth and the Landau-Placzek ratio are in good agreement with the experiment. Author (GRA)

N78-33390# Illinois Univ., Urbana-Champaign. Dept. of Mechanical and Industrial Engineering.

THEORY, COMPUTER PROGRAM, AND ILLUSTRATIVE EXAMPLES FOR THE TWO-DIMENSIONAL BOUNDARY LAYER FLOW OF IDEAL GASES

J. C. Dutton and A. L. Addy 29 Mar. 1978 97 p refs
(Contract DAAK40-76-C-0942)
(AD-A056308; DRDMI-T-CR-78-10) Avail: NTIS HC A05/MF A01 CSCL 20/4

A computer program has been developed to calculate the two-dimensional boundary layer flow of ideal gases. The program is written in FORTRAN 4. Axisymmetric or plane geometries can be analyzed with the boundary layer laminar or turbulent, compressible or incompressible and either with or without heat transfer. A brief outline of the theory upon which the program is based is presented together with complete input instructions and sample input and output. In addition, results computed with this program are compared to available data and analytical solutions for a number of flow situations of interest. GRA

N78-33391# AiResearch Mfg. Co., Phoenix, Ariz.

COAL FIRED PROTOTYPE HIGH TEMPERATURE CONTINUOUS FLOW HEAT EXCHANGER. AF-684 RESEARCH PROJECT 545-1 Final Report, Feb. 1978

Feb. 1978 418 p refs
(EPRI-AF-684) Avail: NTIS HC A18/MF A01

The material investigated was siliconized silicon carbide. The results achieved included: identification of system performance requirements, combustor/heat exchanger module dimensions and layout, and the required critical component research; fabrication of U-bend tubes, tube-to-header joints, tube-to-tube joints and a ten-tube heat exchanger module that was tested at temperature; proved helium containment at 2250 F and 500 psia; performed crack propagation, thermal cycling and mechanical torsion tests with ceramic samples, proving that no erosion or corrosion occurred when ceramic tubes were subjected to molten coal slag and that coal slag could be removed by melt-off; and completion of a conceptual design of a combustor/heat exchanger for test with a small engine. ERA

N78-33392# Los Alamos Scientific Lab., N. Mex.

SODIUM VAPOR HEAT PIPE LASER CELL

J. E. Deverall and G. W. York 22 May 1978 6 p refs Presented at the 3d Heat Pipe Conf., Palo Alto, Calif., 22-24 May 1978
(Contract W-7405-eng-36)
(LA-UR-78-532; Conf-780531-1) Avail: NTIS HC A02/MF A01

A sodium heat pipe cell containing high-voltage discharge plates was constructed to study the band absorption of light by the sodium dimer and to determine the feasibility of creating a metal vapor laser. Spectrographic measurements indicated that the increase in sodium dimer population with temperature resulted in 90% light absorption at 970 K. High-voltage discharges in the sodium vapor dissociated the dimers and restored transparency to the medium. No lasing action of the sodium vapor with high-voltage discharges was observed either because of insufficient ionization or nonuniformity of the ionization over the plate area. ERA

N78-33393# Union Carbide Corp., Oak Ridge, Tenn. Computer Sciences Div.

EVOLUTION OF AN FR-80 GENERATED MOVIE OF OPPOSED JET FLUID FLOW

D. C. Elrod 1978 4 p refs Presented at the 16th SE Reg. ACM Conf., Atlanta, 13-15 Apr. 1978 Submitted for publication

(Contract W-7405-eng-26)
(K/CSD/INF-78/15; Conf-780437-1) Avail: NTIS HC A02/MF A01

The use of computer-graphics in the numerical modeling of natural phenomena is assessed. The steps taken and techniques used to expand the capabilities of the FLOW-PLOT program to produce 16 mm movies on graphics recorder are described. ERA

N78-33394# Los Alamos Scientific Lab., N. Mex.
INVESTIGATION OF HEPA FILTERS SUBJECTED TO TORNADO PRESSURE PULSES: INITIAL STRUCTURAL TESTING
W. S. Gregory, H. L. Horak, P. R. Smith (New Mexico State Univ., University Park), C. I. Ricketts (New Mexico State Univ., University Park), and W. Gill Mar. 1978 14 p refs
(Contract W-7405-eng-36)
(LA-7202-MS) Avail: NTIS HC A02/MF A01

Initial results from a program to determine response of 610 x 610-mm (24 x 24 in.) HEPA filters to tornado-induced pressure transients are described. Filters were structurally tested by subjecting them to 20.7 kPa (3-psi) pressure differentials at pressurization rates from 6.9 kPa/s (1 psi/s) to 34.5 kPa/s (5 psi/s). Two sizes of filters were used in the tests: 149 mm (5 7/8 in.) thick and 292 mm (11 1/2 in.) thick. The 149 mm (5 7/8 in.) thick filters failed catastrophically at 20.7 kPa (3-psi) pressure differentials. Pressure drop across the filters, not pressurization rate, appears to be the primary cause of failure. The 292 mm (11 1/2 in.) thick filters were also tested with the above pressurization rates. These units failed by breakage of the folded downstream ends of the fiber mat. Of four 292 mm (11 1/2 in) thick filters tested, a 20.7 kPa (3 psi) pressure differential produced failure at the lowest and highest pressurization rates, but not at two intermediate rates. ERA

N78-33395# Sandia Labs., Albuquerque, N. Mex.
NACHOS: A FINITE ELEMENT COMPUTER PROGRAM FOR INCOMPRESSIBLE FLOW PROBLEMS. PART 1: THEORETICAL BACKGROUND
David K. Gartling Apr. 1978 55 p refs
(Contract EY-76-C-04-0789)
(SAND-77-1333-Pt-1) Avail: NTIS HC A04/MF A01

The NACHOS code designed for the two-dimensional analysis of viscous incompressible fluid flows, including the effects of heat transfer, is described as well as the fluid/thermal boundary value problems treated by the program. The finite element method and the associated numerical methods used are also presented. ERA

N78-33396# Los Alamos Scientific Lab., N. Mex.
PERFORMANCE INVESTIGATIONS OF LIQUID-METAL HEAT PIPES FOR SPACE AND TERRESTRIAL APPLICATIONS
J. E. Kemme, E. S. Keddy, and J. R. Phillips 1978 9 p refs
Presented at the 3d Intern. Heat Pipe Conf., Palo Alto, Calif., 22-24 May 1978; sponsored by AIAA
(Contract W-7405-eng-36)
(LA-UR-78-547; Conf-780531-3) Avail: NTIS HC A02/MF A01

The high heat transfer capacity of liquid metal heat pipes is demonstrated in performance tests with mercury, potassium, sodium, and lithium working fluids and wick structures which serve to minimize liquid pressure losses and vapor/liquid interactions. Appropriate wicks for horizontal and vertical operation are described. It is shown that heat-transfer with these wicks is limited by vapor flow effects. Examples are given of particular effects associated with a long adiabatic section between evaporator and condenser and with a heat source of uniform temperature as opposed to a source of uniform power. ERA

N78-33397# Bendix Corp., Kansas City, Mo.
EFFECTS OF DEBURRING CONTAMINANTS ON ELECTROPLATING ADHESION Final Report
L. K. Gillespie Feb. 1978 46 p refs
(Contract EY-76-C-04-0613)
(BDX-613-1757-Rev) Avail: NTIS HC A03/MF A01

Vibratory deburring and centrifugal barrel finishing can result in inadequate adhesion of electroplated metals. Fine particles of the abrasive metals and compounds used in these processes impregnate the exposed surfaces of the workpieces. If too many of these particles are in the workpiece surfaces, electroplated coatings fail to adhere properly. Ceramic bonded aluminum oxide media causes fewer adhesion problems than fused aluminum oxide media. The implications of impregnated material in other processes were also explored. ERA

N78-33398# AeroChem Research Labs., Inc., Princeton, N. J.
EXPERIMENTAL STUDY OF CHEMICALLY REACTING TURBULENT FREE SHEAR LAYERS
R. K. Gould Nov. 1977 53 p refs
(Contract EX-76-C-01-2446)
(FE-2446-4; AeroChem-TP-364) Avail: NTIS HC A04/MF A01

The objective of this program was to measure species concentrations and their statistical properties at points in well-characterized chemically reacting turbulent flows. Such measurements were required for (1) testing theories of reacting turbulent systems and (2) as input to models which predict the behavior of practical combustors. The model chemical reaction being used to study turbulent mixing/reacting flows was the NO/O3 reaction. A photolysis/chemiluminescence technique was used to measure reactant concentrations, (NO) and (O3), and a product concentration, (NO2), simultaneously at points in the flow field. From such measurements, the required statistical quantities, i.e., probability density functions and correlations of reactants and product concentrations, are being developed. These data were supplemented by measurements of the turbulence power spectra and intensity at the same points. ERA

N78-33399# Argonne National Lab., Ill.
ANALYSIS OF HEAT TRANSFER IN HORIZONTAL TUBE FALLING FILM EVAPORATORS
J. J. Lorenz and D. Yung Mar. 1978 42 p refs
(Contract W-31-109-eng-38)
(ANL-OTEC-78-1) Avail: NTIS HC A03/MF A01

A model of combined boiling and evaporation of liquid films on horizontal tubes was developed. Specifically, this work was directed toward developing a heat transfer model applicable to the design of horizontal tube falling film evaporators for OTEC. The heat transfer process is modelled as combined boiling and evaporation of the liquid film. In modelling the behavior of single tubes special account is taken of heat transfer in the initial thermal developing region of the film. The predicted upper and lower limits of heat transfer for ammonia on a vertical bank of plain horizontal tubes are 5.4 kW/sqm-K and 3.1 kW/sqm-k, respectively. For an OTEC evaporator with plain tubes, the upper and lower limits of the overall U are 2.33 kW/sqm-K and 1.82 kW/sqm-K, respectively. With ammonia-side boiling enhancement, the overall U can be increased to about 3.8 kW/sqm-K. ERA

N78-33400# National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
HYDRAULIC RESEARCH IN THE UNITED STATES AND CANADA Final Special Publication
Pauline H. Gurewitz Apr. 1978 378 p refs
(PB-281501/7; NBS-SP-497; LC-73-60019) Avail: NTIS HC A17/MF A01 CSCL 20D

Current and recently concluded research projects in hydraulics and hydrodynamics for the years 1975-1976 are summarized. Projects from more than 200 university, industrial, state and federal government laboratories in the United States and Canada are reported. GRA

N78-33401# George Washington Univ., Washington, D. C. School of Engineering and Applied Science.
VISCOUS ENTRAINMENT OF MASS AND ENERGY IN FLUID DYNAMIC ENERGY SEPARATION Interim Report
David R. Sobel Mar. 1978 116 p refs
(Grant NSF ENG-75-0149)
(PB-281759/1; TR-ES-781) Avail: NTIS HC A06/MF A01 CSCL 20D

This study dealt with the viscous interaction between the jet and the translating impingement surface, and with the adverse effect that the viscous entrainment of mass and energy from the high energy to the low energy stream may have on the performance of the energy separator. The solution required the

development of an implicit, iterative finite difference scheme, and its essential validity was verified both experimentally and by application to special cases for which the solutions were available. Application of the procedure to a representative geometry and operating condition revealed that the effect of viscosity on the performance of the energy separator was negligible. GRA

N78-33402# National Technical Information Service, Springfield, Va.
DRAG REDUCING FLUIDS. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1969 - Jul. 1978
Guy E. Habercom, Jr. Jul. 1978 253 p Supersedes NTIS/PS-77/0596; NTIS/PS-76/0533; NTIS/PS-75/497; COM-73-11674 (NTIS/PS-78/0730/8; NTIS/PS-77/0596; NTIS/PS-76/0533; NTIS/PS-75/497; COM-73-11674) Avail: NTIS HC $28.00/MF $28.00 CSCL 20D

Drag reducing and non-newtonian fluids, along with some studies on elastohydrodynamics, are researched. Theory, chemical formulations, test procedures, and applications are included. GRA

N78-33403# National Technical Information Service, Springfield, Va.
NUMERICAL METHODS IN FLUID FLOW PROBLEMS, VOLUME 3. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Aug. 1976 - 1977
Guy E. Habercom, Jr. Aug. 1978 168 p
(NTIS/PS-78/0823/1) Avail: NTIS HC $28.00/MF $28.00 CSCL 20D

Among the numerical techniques for analysis of fluid flow problems include finite difference theory finite element analysis, and numerical integration of differential equations including the Navier-Stokes equations. Areas studied include boundary layer, hypersonic, supersonic, transonic regimes, atmosphere entry, heat transfer, blunt and concave bodies, gas dynamics, nozzle gas flow, turbomachinery, and hydrodynamics. GRA

N78-33404# National Technical Information Service, Springfield, Va.
NUMERICAL METHODS IN FLUID FLOW PROBLEMS, VOLUME 4. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Sep. 1977 - Jul. 1978
Guy E. Habercom, Jr. Aug. 1978 128 p Supersedes NTIS/PS-77/0798; NTIS/PS-76/0740; NTIS/PS-75/643; COM-74-11489
(NTIS/PS-78/0824/9; NTIS/PS-77/0798; NTIS/PS-76/0740; NTIS/PS-75/643; COM-74-11499) Avail: NTIS HC $28.00/MF $28.00 CSCL 20D

Among the numerical techniques for analysis of fluid flow problems include finite difference theory, finite element analysis, and numerical integration of differential equations including the Navier Stokes equations. Areas studied include boundary layer, hypersonic, supersonic, transonic regimes, atmosphere entry, heat transfer, blunt and concave bodies, gas dynamics, nozzle gas flow, turbomachinery, and hydrodynamics. GRA

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N78-33405*# Gustincic (J. J.) Consulting Engineer, Marina Del Rey, Calif.
AN AIRCRAFT RADIOMETER FRONT END, ADDENDUM Final Report
J. J. Gustincic 1 Aug. 1978 19 p Prepared for JPL
(Contracts NAS7-100; JPL-954492)
(NASA-CR-157777; TR080) Avail: NTIS HC A02/MF A01 CSCL 14B

A detailed description is given of a completely quasi-optical aircraft radiometer for use at frequencies of 150 GHz and above. The radiometer calibration and beam switching is described as well as a reflection isolator utilizing a reciprocating mirror and a quasi-optical local oscillator injection system. Receiver applications and performance levels are also given. Author

N78-33406*# Honeywell Electro-Optics Center, Lexington, Mass.
IMPROVED DETECTIVITY OF PYROELECTRIC DETECTORS Final Report
D. E. Marshall, J. C. Gelpey, J. W. Marciniec, A. M. Chiang, and R. B. Maciolek (Honeywell Corporate Mater. Sci. Center) Jun. 1978 178 p
(Contract NAS1-14372)
(NASA-CR-158917) Avail: NTIS HC A09/MF A01 CSCL 14B

High detectivity single-element SBN pyroelectric detectors were fabricated. The theory and technology developments related to improved detector performance were identified and formulated. Improved methods of material characterization, thinning, mounting, blackening and amplifier matching are discussed. Detectors with detectivities of 1.3 x 10 to the 9th power square root of Hz/watt at 1 Hz are reported. Factors limiting performance and recommendations for future work are discussed. G.G.

N78-33407*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DUST ADHESION ON VIKING LANDER CAMERA WINDOW
Jag J. Singh Sep. 1978 34 p refs
(NASA-TM-78782) Avail: NTIS HC A03/MF A01 CSCL 14E

Studies of dust impingement on a duplicate Viking Lander camera window indicated the possibility of window obscuration after several days of exposure even at low dust concentration levels. As a result the following corrective measures were recommended: (1) The clearance between the housing surface and the camera post should be eliminated by using an appropriately designed plastic skirt: (2) The three horizontal ledges below the window inside the cavity act as bases for pile-up of dust that slides down the window surface; they should be replaced by a single inclined plane down which the dust will slide and fall out on the ground: (3) Adhered dust on the window surface can be removed by high pressure CO2 jets directed down against the window; the amount of CO2 gas needed for the entire mission can be carried in a 3 1/2-inch diameter sphere equipped with a remotely programable valve. These measures were incorporated in the design of the lander camera system. The continued high quality of photographs transmitted from the Viking spacecraft several months after landing attests to their effectiveness. Author

N78-33408# Textron Bell Aerospace Co., Buffalo, N. Y.
DEVELOPMENT, TEST, AND CALIBRATION OF A THREE-AXIS ACCELEROMETER SYSTEM Final Report, 6 Dec. 1973 - 31 Dec. 1977
William G. Lange 15 Dec. 1977 32 p
(Contract F19628-74-C-0114)
(AD-A056711; AFGL-TR-78-0003; Rept-6384-928032) Avail: NTIS HC A03/MF A01 CSCL 22/2

This report describes the development test and calibration of a single proof mass three axis electrostatic accelerometer intended for atmospheric density measurements in an earth orbiting satellite. Author (GRA)

N78-33409# Hawaii Inst. of Geophysics, Honolulu.
CONVERSION FROM FILM TO MAGNETIC CASSETTE RECORDING FOR CURRENT METER
Alex I. Nakamura (Pacific Marine Environ. Lab., Seattle, Wash.) and Robert R. Harvey Apr. 1978 20 p refs
(Contract N00014-75-C-0209)
(AD-A056962; HIG-Contrib-889; NOAA-TM-ERL-PMEL-11; PMEL-Contrib-889) Avail: NTIS HC A02/MF A01 CSCL 14/2

This report describes a conversion of the Geodyne 102 current meter, which recorded its data on film, to digital cassette tape recording. Sufficient information is included to enable the reader to implement this modification. Author (GRA)

N78-33410# Army Tank-Automotive Research and Development Command, Warren, Mich.
PULSED HOLOGRAPHIC ANALYSIS OF LARGE VIBRATING VEHICLE COMPONENTS
Grant Gerhart and Gregory Arutunian Jun. 1978 14 p
(AD-A056439) Avail: NTIS HC A02/MF A01 CSCL 20/6

Double-pulsed holography provides a measurement technique for the analysis of large surface areas of vibrating components. A particular advantage of holography is that it requires no contact with the vibrating object, and it gives a solution to a classical problem in the area of both acoustic and vibration analysis. The surface of a vibrating object is represented by a series of fringes which connect points that have equal amplitudes of displacement. Since holography is based on interferometry, the accuracy is within a fraction of the wavelength of light. GRA

N78-33411# Air Force Geophysics Lab., Hanscom AFB, Mass.
AN OBSERVER'S MANUAL FOR THE AIR FORCE SWEPT FREQUENCY INTERFEROMETRIC RADIOMETER
Kenneth E. Eis and Richard C. Rickard 21 Feb. 1978 77 p refs
(AF Proj. 4643)
(AD-A056994; AFGL-TR-78-0048; AFGL-IP-283) Avail: NTIS HC A05/MF A01 CSCL 03/1

This report describes the theory and equipment associated with the Swept Frequency Interferometric Radiometer (SFIR). The report emphasizes data reduction and classification of the SFIR data. It is intended as a detailed manual to be used operationally, and as a training aid for those involved in reducing the SFIR data. Author (GRA)

N78-33412# Michigan State Univ., East Lansing. Dept. of Chemistry.
THE DESIGN AND OPERATION OF AN AUTOMATED, HIGH-EFFICIENCY PHOTOIONIZATION MASS SPECTROMETER Ph.D. Thesis
E. J. Darland and G. E. Leroi 24 Feb. 1978 534 p refs
(Contract N00014-76-C-0434)
(AD-A056269; TR-1) Avail: NTIS HC A23/MF A01 CSCL 14/2

A computer-controlled photoionization mass spectrometer is described, as are operating procedures designed to achieve maximum possible efficiency during data acquisition, and very high efficiency overall. The software necessary to implement these procedures, as well as a set of guidelines which have been developed for facilitating user-computer interaction, are also described. An extensive safety interlock system, which monitors and controls the complex vacuum system and other utilities, is described in detail, as are the computer-interface electronics. The latter includes a unique pulse amplifier circuit designed for fast photon or ion-counting applications. The new instrument has been used to study the mixed chlorofluoromethanes CFCl3, CF2Cl2, and CF3Cl. There is some evidence that the observed parent ion appearance potentials may be significantly above the adiabatic ionization potentials for all three molecules, and further work is recommended to resolve several apparent paradoxes in presently available data for both parent and fragment ions. GRA

N78-33413# Texas Technological Univ., Lubbock. Optical Sciences Lab.
ELLIPSOMETRIC DETERMINATION OF PROPERTIES OF FILMS ON ROUGH SURFACES SUCH AS ALUMINUM ALLOY AIRCRAFT SKIN Interim Report, 1 Jan. 1976 - 1 Aug. 1977
John D. Reichert and Janet Shotton Brock 1 Aug. 1977 141 p refs
(Grants AF-AFOSR-3278-77; AF-AFOSR-2451-73G)
(AD-A056782; TTCSL-OLT-3; AFOSR-78-1220TR) Avail: NTIS HC A07/MF A01 CSCL 14/2

The properties of oxide layers on smooth and rough aluminum surfaces are considered in this study. Using ellipsometric techniques, the layer thickness and the four parameters describing the complex indices of refraction for film and substrate are assigned effective values and interrelations are deduced. The organizing feature of the work is the use of data trajectories generated by determining the ellipsometric parameters Psi and Delta over and over for samples that were heated between measurements. The heating caused increases in the oxide layer thickness, so that the data trajectories could be used along side theoretical thickness curves to determine appropriate effective media parameters. One of the more interesting results was the representation of rolling grain marks on alclad by an effective complex index of refraction. The effective index determined was dependent on the sample orientation. Author (GRA)

N78-33414# Sandia Labs., Albuquerque, N. Mex.
ACTIVE DEVICES FOR HIGH TEMPERATURE MICROCIRCUITRY
David W. Palmer, Bruce L. Draper, John D. McBrayer, and Kyle R. White Feb. 1978 122 p refs
(Contract EY-76-C-04-0789)
(SAND-77-1145) Avail: NTIS HC A06/MF A01

As part of a program to develop high temperature electronics for geothermal well instrumentation, a number of solid state diode and transistor types were characterized from room temperature to 300 C. The temperature dependence and aging stability of transport and leakage properties were measured. Included in the study were silicon diodes, bipolar transistors, JFETs, MOSFETs, and GaAs MESFETs and JFETs. Standard solder, epoxy, and chip and wire attachment technologies were not functional at 300 C. Gold-germanium solder, aluminum wire to 9910 gold film, and diffusion barrier pads were developed to allow high temperature attachment. ERA

N78-33415# Los Alamos Scientific Lab., N. Mex.
FIBER-OPTIC TIME DOMAIN REFLECTOMETER
P. B. Lyons, J. E. Golob, L. D. Looney, M. A. Nelson, and T. J. Davies 1978 6 p refs
(Contract W-7405-eng-36)
(LA-UR-78-824) Avail: NTIS HC A02/MF A01

An optical time domain reflectometer is described which combines in one instrument the basic capability to analyze several important fiber characteristics. The device uses the polarization properties of light to enable high sensitivity fault detection close to the fiber input end; its probe pulse temporal characteristics and high gain photodetector in combination provide excellent discontinuity location resolution in long lossy fibers, and give an indication of fiber dispersion at large bandwidths. ERA

N78-33416# Argonne National Lab., Ill.
FEASIBILITY STUDY OF ACOUSTIC ULTRASONIC FLOWMETERS FOR SOLID/GAS SYSTEMS
A. C. Raptis, J. W. Fitzgerald, G. F. Popper, R. Doolittle, and S. H. Sheen Mar. 1978 36 p refs
(Contract W-31-109-eng-38)
(ANL-FE-49622-TM01) Avail: NTIS HC A03/MF A01

An analysis of sonic techniques for flow measurement in solid/gas media shows that operation of a transmission type flowmeter is feasible in the frequency range from about 32.5 kHz to 400 kHz, depending on the path length and particle concentration. For small light particles a flowmeter is feasible in the lower end of the frequency range, while for intermediate and large particles a flowmeter is feasible in the intermediate and higher ranges respectively. The attenuation constants for various representative media were calculated for various temperatures and pressures. ERA

N78-33417# Sandia Labs., Albuquerque, N. Mex.
MULTIPLE CAVITY LASER HOLOGRAPHIC SYSTEM
M. J. Landry and A. E. McCarthy Mar. 1978 15 p
(Contract EY-76-C-04-0789)
(SAND-78-0496) Avail: NTIS HC A02/MF A01

A four pulse multiple cavity laser (MCL) holographic system was developed for use in recording time sequential holograms of fast events. It was used to record four double exposed holograms of an exploding bridge wire on a single 10E75 plate with 2 or 5 microsecond framing time. The complex change in index of refraction of the plasma created is visible in the fringe structure of the reconstructed image. The shock front was measured to propagate at an average speed of between 0.13 and 0.14 cm microsecond. Main advantages of MCL holographic system are: (1) low cost, (2) greater energy/time interval, and (3) electronic control of the time interval between frames. ERA

N78-33418# Los Alamos Scientific Lab., N. Mex.
WIRE-SCANNER REENTERING EXPERIMENT ERROR ESTIMATES

G. R. Swain Sep. 1977 25 p
(Contract W-7405-eng-36)
(LA-6959-MS) Avail: NTIS HC A02/MF A01

In the wire scanner recentering experiment, the effective center of a wire was determined by turning the previous quadrupole magnet on and off. The beam was steered into the quadrupole such that it drifted to the same point somewhere on a second wire scanner downstream, for the quadrupole both on and off. With this steering, the beam was assumed to be centered at the quadrupole and first wire scanner. Approximate formulas and more exact numerical calculations show that for any incoming position at the quadrupole (not just the center), there was a corresponding incoming angle such that the beams for the quadrupole on and off will drift to the same point. Errors in the recentering experiment of 9 to 13 February 1977 due to the beams not converging to exactly the same point and due to the convergence point being off axis were estimated to be 0.8 mm or less. Errors from quadrupole angular misalignments were estimated to be 0.5 mm or less. ERA

36 LASERS AND MASERS

Includes parametric amplifiers.

N78-33419 California Univ., Irvine.
CHARACTERISTICS OF AMPLIFIED SPONTANEOUS EMISSIONS IN HIGH-GAIN GAS-LASER AMPLIFIERS Ph.D. Thesis
Hidenori Osada 1978 161 p
Avail: Univ. Microfilms Order No. 78-11861

Formulas were developed for gain and spectral line-narrowing, including saturation intensity for incident broadband amplified spontaneous emissions. By introducing a new parameter, the ratio of incident linewidth to Doppler linewidth and the degree of saturation, the dependence of the gain and spectral line-narrowing upon laser parameters such as Lorentz linewidth, Doppler linewidth and gain parameter of partially homogeneously broadened laser amplifiers was modeled. The formulas are applied to the characteristic xenon 3.51 micron gas-laser amplifier.
Dissert. Abstr.

N78-33420 Polytechnic Inst. of New York.
CHANGE IN REFLECTIVITY OF A METAL SURFACE DURING INTENSE LASER IRRADIATION Ph.D. Thesis
Kyunglin Park 1978 175 p
Avail: Univ. Microfilms Order No. 7816637

Specular and total reflectivities of copper, aluminum and brass surfaces during intense laser irradiation by a Q-switched ruby laser pulse of 30 nsec FWHM and 600 mj were measured. The intensity of the incident laser radiation on the target metal surface was in the range of 10 to the 7th power to 10 to the 9th power W/sq cm. A theory of the integrating sphere for pulsed light sources was developed to account for its time-integrating property which significantly lengthened the pulse shape. The temperature history of the metal surface during and after the laser pulse was obtained from the intensity of the incident laser radiation and the measured time dependence of the total reflectivity. A method was developed for this purpose. Results of the specular reflectivity measurements show that specular reflectivity is a sensitive indicator of the surface deformation history. Dissert. Abstr.

N78-33421 Rochester Univ., N. Y.
INVESTIGATIONS OF THE COHERENCE PROPERTIES OF A RING LASER Ph.D. Thesis
Mohammad M-Tehrani 1978 120 p
Avail: Univ. Microfilms Order No. 7815307

A model was developed for a ring laser in which the two counter-rotating modes are coupled through their intensities and complete for the excited atomic population. This competition leads to negative correlations between the intensity fluctuations of the two modes, whose magnitude depends on the detuning of the laser cavity from the atomic line center. Expressions for the fluctuations and correlations of the intensities of the two light beams are derived theoretically. The two-time amplitude and intensity correlation functions of light are calculated for the case of a symmetric ring laser at line center, and are shown to be expressible in terms of the eigenfunctions and eigenvalues of a certain Schroedinger equations, in complete analogy with the theory of the single-mode laser. However, it is shown that the intensity correlation time increases with pump parameter above threshold unlike that of the single-mode laser.
Dissert. Abstr.

N78-33422 Catholic Univ. of America, Washington, D. C.
A THEORETICAL INVESTIGATION OF SIGNAL ACQUISITION AND DIGITAL COMMUNICATION IN A COUPLING-MODULATED CARBON DIOXIDE LASER SYSTEM Ph.D. Thesis
John Harley McElroy 1978 316 p
Avail: Univ. Microfilms Order No. 7816873

The signal-to-noise ratio necessary to achieve a given probability of error in a realistic, free-space, carbon dioxide laser system was determined using coupling modulation. The boundary conditions established by the acquisition process under which communications must occur were also determined. Given an analytical model of the transmitter, and the acquisition boundary conditions, a complete end-to-end model of the communications system can be formed. The essential elements are the modulator drive, the modulation process, the receiver front-end (Doppler tracking) filter, and data filter. A computer model of the system was developed and two analytical approaches were utilized.
Dissert. Abstr.

N78-33423 Rice Univ., Houston, Tex.
ELECTRON BEAM PUMPED VAPOR PHASE DYE LASERS Ph.D. Thesis
Richard Lynn Cordray 1978 137 p
Avail: Univ. Microfilms Order No. 78-14754

Experiments are described in which dye vapor-buffer gas combinations are excited by high energy, high current electron beams and produce intense fluorescence. A compact, high temperature, high pressure dye cell is described which offers maximum electron energy deposition at the optical axis and thermal isolation from the e-beam machine. Electron beam current density optimization procedures are also discussed. The design of a prealigned, all quartz optical resonator is also described.
Dissert. Abstr.

N78-33424*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ANOMALOUS DISPERSION AND THE PUMPING OF FAR INFRARED (FIR) LASERS
Nabil M. Lawandy Jul. 1978 11 p refs
(NASA-TM-79596; G-7802-17) Avail: NTIS HC A02/MF A01 CSCL 20E

It is shown that the anomalous dispersion at the pump transition in molecular far-infrared lasers (FIR) can lead to sizable focusing and defocusing effects. Criteria for beam spreading and trapping are considered with CH2F as an example. Author

N78-33425*# Williams Coll., Williamstown, Mass.
STUDY OF IMPROVEMENT OF HYDROGEN MASER FREQUENCY STANDARD
Stuart B. Crampton 1 Oct. 1977 20 p refs Sponsored in part by the Research Corp.
(Contract NAS5-23520; Grant NSF PHY-74-12226)
(NASA-CR-156836) Avail: NTIS HC A02/MF A01 CSCL 20E

Reduction of the atom leakage rate was examined, using as storage surfaces the FEP teflon surfaces conventionally used in contemporary hydrogen maser frequency standards. Some work was also done on a possible alternative to the conventional surfaces, but the results here and elsewhere suggest that the alternative surface is not promising enough to warrant much further work. G.Y.

N78-33426# Lincoln Lab., Mass. Inst. of Tech., Lexington.
EXPERIMENTAL DETERMINATION OF SINGLE AND MULTIPLE PULSE PROPAGATION
Richard W. ONeil, Herbert Kleiman, and Harry R. Zwicker 3 Feb. 1978 19 p refs Presented at the AGARD meeting, Lyngby, Denmark, Oct. 1975

(Contract F19628-78-C-0002; ARPA Order 6008)
(AD-A055570; LTP-23; ESD-TR-78-29) Avail: NTIS HC A02/MF A01 CSCL 20/5

In this paper thermal blooming of focused single and multiple pulse lasers is considered. Experimental procedures are described to characterize the reduction in far field irradiance observed for pulses whose duration is comparable to and shorter than tau sub H, an acoustic transit time across a focal radius. Experimental measurements of short pulse blooming (t tau sub H) are compared with a scalar wave theoretical computer model embodying the medium hydrodynamics. Agreement with the short pulse theory is generally good. An experiment was designed to test the quantitative predictive capability of a steady state multiple pulse computer code. Blooming of a multiple pulse beam was measured as a function of absorbed energy and spatial overlap of successive pulses. With no adjustable parameters agreement between the actual measurements and those predicted by theory is very good. Author (GRA)

N78-33427# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
RESEARCH IN LASER PROCESSES Semiannual Report, 1 Feb. - 31 Jul. 1977
A. V. Phelps and A. C. Gallagher 21 Apr. 1978 27 p refs
(Contract N00014-76-C-0123; NR Proj. 012-512; ARPA Order 2683)
(AD-A056030) Avail: NTIS HC A03/MF A01 CSCL 20/5

Measurements have been made of the electrical and optical properties of electrical discharges in Na-Xe mixtures at high pressures. Although the discharges show desirable features such as positive volt-ampere characteristics, the excited state densities are too low for useful gain. Since this does not appear to be the case in Tl-Xe, experiments and modeling directed toward an explanation were initiated. Scaling laws for the cathode fall region of discharges in helium have been used to extend low pressure experimental results to high pressures. Measurements are being made of electron excitation rate coefficients for the A 3 Sigma(-) sub u state of N2 in the range of mean energies of laser interest. Predictions have been made of large decreases in optical pumping efficiency at the center of the resonance lines of metal vapors, and experiments are underway to test the theory. Author (GRA)

N78-33428# United Technologies Research Center, East Hartford, Conn.
CALCULATION OF THE ENERGETICS AND COLLISION DYNAMICS OF ELECTRONIC TRANSITION LASERS Interim Report
H. Harvey Michels and R. H. Hobbs May 1978 36 p refs
(Contract F49620-77-C-0064)
(AD-A056896; UTRC/R78-922853; AFOSR-78-1187TR) Avail: NTIS HC A03/MF A01 CSCL 20/5

The research performed under this contract was directed toward the calculation of the electronic structure of selected chemical systems in order to determine their potential as laser systems. The systems studied included the O(-) sub g symmetry of Hg2, the A 2 Sigma(-) sub u and B2 Sigma(-) sub g states for Hg2(-), all low-lying 2 Sigma and 2 Pi states of MgNa and the 2 Sigma and 2 Pi states of HgTl. A list is given of the publication and talks resulting from this program. Author (GRA)

N78-33429# Science Applications, Inc., Ann Arbor, Mich.
AN INVESTIGATION OF THE GASEOUS CHARACTER OF THE ATMOSPHERE AT THE HIGH ENERGY LASER TEST FACILITY HELSTF AT THE WHITE SANDS MISSILE RANGE (WSMR)
W. Flowers, L. Chaney, R. Meredith, and D. Woods May 1978 94 p refs
(Contract DAEA18-73-A-0127)
(AD-A056378; SAI-77-007-AA; ERADCOM/ASL-CR-78-0127-1) Avail: NTIS HC A05/MF A01 CSCL 20/5

The results of the first phase of an investigation to determine the gaseous character of the atmosphere at several sites on the White Sands Missile Range (WSMR) are reported. The object of the study is to attain an understanding of gaseous molecular content at WSMR as it will affect high energy laser (HEL) performance in tests planned for the near future. Hydrogen Fluoride (HF), Deuterium Fluoride (DF), Carbon Monoxide (CO), and Carbon Dioxide (O2) HEL's have been included in the study. In this phase, current understanding of atmospheric natural and pollutant molecular absorption in the laser bands has been reviewed, gases requiring monitoring at the site have been identified, measurement techniques have been assessed for the several gases, and measurements procedures have been recommended. Measurements of the gaseous character at WSMR have been initiated, and this progress is described. The gases which require monitoring have been selected by a sensitivity study which includes investigation of the uncertainty in gas content at the WSMR sites and the importance of the presence of the gas to each potential HEL. GRA

N78-33430# Army Electronics Research and Development Command, Fort Monmouth, N. J.
UNSTABLE RESONATORS FOR ARMY LASER DESIGNATORS
Theodore F. Ewanizky Jun. 1978 12 p refs
(AD-A056432) Avail: NTIS HC A02/MF A01 CSCL 17/8

The objective of this program was to investigate optical resonator properties relevant to the improvement of laser systems suitable for military designator/rangefinder applications. A study of the particular characteristics of a negative-branch, unstable resonator laser was performed. Laboratory experimentation revealed unique aspects which offer a new approach to solutions of existing technological problems of: beam quality, operational efficiency and reliability, and boresight stability. GRA

N78-33431# Army Electronics Research and Development Command, Fort Monmouth, N. J. Electronic Warfare Lab.
A FOUR-CHANNEL POLARIMETER TO MEASURE NANOSECOND LASER PULSES
Edward Collett Jun. 1978 17 p refs
(AD-A056423) Avail: NTIS HC A02/MF A01 CSCL 20/6

A four-channel polarimeter can be used to determine the polarization characteristics of optical components, systems, and other related phenomena. While the primary purpose of the four-channel configuration is to measure the four Stokes polarization parameters in a nanosecond duration, there is an additional benefit to the design. This is shown by illuminating an optical system with right circularly polarized light or linearly -45 deg polarized light. Each of the measured Stokes parameters is then equal to one of the unknown A, B, C, D matrix elements. In many situations of military interest this property could be invaluable. GRA

N78-33432# Army Electronics Research and Development Command, Fort Monmouth, N. J. Night Vision and Electro-Optics Lab.
UNSTABLE RESONATOR RETROFITTED HANDHELD LASER DESIGNATOR Final Report
T. F. Ewanizky Jun. 1978 24 p
(Contract F04606-75-A-0030)
(AD-A057248; DELNV-TR-78-2) Avail: NTIS HC A02/MF A01 CSCL 20/5

A confocal, unstable resonant cavity and hybrid system was retrofitted to an existing Handheld Laser Designator (HLD). Performance characteristics of the retrofitted laser with a conventional version are compared. Unique capabilities of the unstable resonator are described, and recommendations for future development based on test results and experimentation are included. Author (GRA)

N78-33433# Naval Surface Weapons Center, White Oak, Md.
FAST REACTIONS OF ALUMINUM: A LITERATURE REVIEW
Alexander G. Rozner and James R. Holden 21 Dec. 1977 47 p refs
(SF33354391)
(AD-A057215; NSWC/WOL/TR-77-163) Avail: NTIS HC A03/MF A01 CSCL 11/6

A review has been conducted of the report and journal literature on reactions of aluminum with water and with detonation product gases from organic high explosives. Explosions which occur when molten aluminum is dropped into liquid water are caused by rapid vaporization of water and not by chemical reaction. Stoichiometric mixtures of aluminum and water can detonate if initiated by a sufficient size explosive booster. Mixtures

of aluminum and oxygen can be detonated and aluminum should increase the detonation velocity of explosive mixtures containing excess oxygen. Heats of detonation have been measured calorimetrically and the gaseous products have been contained and analysed. Author (GRA)

N78-33434# Illinois Univ., Urbana. Nuclear Engineering Program.

NUCLEAR PUMPING OF A NEUTRAL CARBON LASER

M. A. Prelas, J. H. Anderson, F. P. Boody, S. J. S. Nagalingam, and G. H. Miley 1978 10 p refs Presented at the 3d NASA Conf. on Radiation Energy Conversion, Moffett Field, Calif., 26-28 Jan. 1978

(Contract EY-76-S-02-2007)

(COO-2007-94; Conf-780135-3) Avail: NTIS HC A02/MF A01

Nuclear pumped lasing on the neutral carbon line at 1.45 microns was achieved in mixtures of He-CO, He-CO2, Ne-CO and Ne-CO2. A low thermal neutron flux of 2 x 10 to the 14th power n/sq cm/sec was required and delays of up to 5.5 ms were observed. Helium pressures ranged from 20-800 T, Ne from 100-200 T, CO from 0.25 to 20 mT and CO2 from 0.1 to 25 mT. ERA

N78-33435*# Illinois Univ., Urbana.

NUCLEAR PUMPING OF A NEUTRAL CARBON LASER

M. A. Prelas, J. H. Anderson, F. P. Boody, S. J. S. Nagalingam, and G. H. Miley 1978 15 p refs Presented at the 3d NASA Conf. on Radiation Energy Conversion, Moffett Field, Calif., 26-28 Jan. 1978 Sponsored in part by NASA

(Contract EY-76-S-02-2007)

(NASA-CR-157728; COO-2007-95; Conf-780135-1) Avail: NTIS HC A02/MF A01 CSCL 20E

Nuclear pumped lasing on the neutral carbon line at 1.45 micron was achieved in mixtures of He-CO, He-N2-CO, He-CO2, and Ne-CO and Ne-CO2. A minimum thermal neutron flux of 2 x 10 to the 14th power sq cm-sec was sufficient for oscillation in the helium mixtures. The peak of the laser output was delayed up to 5.5 ms relative to the neutron pulse in He-CO2, He-N2-CO, Ne-CO, and Ne-CO2 mixtures while no delay was observed in He-CO mixtures. Lasing was obtained with helium pressures from 20 to 800 T, Ne pressures from 100 to 200 T, CO from 0.25 to 20 mT, N2 from 0.5 mT, and CO2 from 0.1 to 25 mT in the respective mixtures. ERA

N78-33436# Oak Ridge Y-12 Plant, Tenn.

LASL LASER MIRROR PROGRAM: EXCERPTS FROM 1/-12 DEVELOPMENT DIVISION Technical Progress Reports, period ending 1 Dec. 1977

C. H. Thompson Mar. 1978 34 p ref

(Contract W-7405-eng-26)

(Y-DA-7591) Avail: NTIS HC A03/MF A01

The effect of masking, fixturing, and irrigating directly in front of the plating surface of a full size Antares mirror was studied at two current densities-2.2 and 4.3 A sq. dm. At both current densities, the surfaces were free of defects. Results suggest that the plating rate can be increased substantially without altering the quality of the deposit. ERA

N78-33437# Oak Ridge Y-12 Plant, Tenn.

LIGHTWEIGHT LASER MIRROR STRUCTURAL STUDIES

J. R. Day 23 Mar. 1978 21 p refs

(Contract W-7405-eng-26)

(Y-DA-7472) Avail: NTIS HC A02/MF A01

Large, optical quality, metallic reflectors up to 2.0 m in dia are required for use in the High Energy Gas Laser Facility (HEGLF) at the Los Alamos Scientific Laboratory. Mirrors of this quality and size can only be made by diamond turning on a highly specialized Ex-Cell-O machine. The 975-kg weight of aluminum stock for a 2 m mirror greatly exceeds the allowable 545-kg total weight of part and chuck on the Ex-Cell-O machine. Accordingly, a program was initiated to develop highly rigid, lightweight mirror substrates for this application. A unique core material (Tubecomb) was developed for economically fabricating these mirrors from commercially available materials. Such mirrors will weigh only 15 to 25% as much as solid metal and will be more rigid. A 267-mm-diameter prototypic Tubecomb mirror was made. Two 406-mm test mirrors were designed and one was built for determining the long term stress strain creep behavior of such structures. Tooling and fixturing were designed for optically evaluating the short and long term mechanical properties of the Tubecomb mirrors. ERA

N78-33438# National Bureau of Standards, Boulder, Colo. Electromagnetics Div.

LASER FAR-FIELD BEAM-PROFILE MEASUREMENTS BY THE FOCAL PLANE TECHNIQUE

G. W. Day and C. F. Stubenrauch Mar. 1978 52 p refs

(PB-281542/1; NBS-TN-1001) Avail: NTIS HC A04/MF A01 CSCL 20E

Particular attention is paid to systems at about 1 micrometer wavelength and having apertures up to 10 cm. The basic mathematics are reviewed and approximations are evaluated. Using geometrical optics techniques, it is shown that an f/20 plano-convex lens is an appropriate choice for the focusing element. For two arbitrarily chosen laser beam profiles, the errors associated with the choice of this lens are discussed through the use of computed farfield and focal-plane irradiance distributions. Experimental procedures including methods of testing the optical elements are given. GRA

N78-33439# National Technical Information Service, Springfield, Va.

DYE LASER, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1975 - Aug. 1978

Mona F. Smith Aug. 1978 207 p Supersedes NTIS/PS-77/0724; NTIS/PS-76/0614; NTIS/PS-539; NTIS/PS-74/120 (NTIS/PS-78/0872/8; NTIS/PS-77/0724; NTIS/PS-76/0614; NTIS/PS-75/539; NTIS/PS-74/120) Avail: NTIS HC $28.00/MF $28.00 CSCL 20E

The citations on dye laser theory, design, components, optical systems, and frequency range are presented. Abstracts on lasing dyes, pumping, tuning, excitation, molecular structure, and modulation are included. Studies on dye laser use in spectroscopy are covered. (This updated bibliography contains 201 abstracts, 60 of which are new entries to the previous edition.) GRA

N78-33440# National Technical Information Service, Springfield, Va.

CARBON DIOXIDE LASERS, VOLUME 3. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Jun. 1976 - Aug. 1978

Mona F. Smith Aug. 1978 231 p Supersedes NTIS/PS-77/0710; NTIS/PS-76/0589; NTIS/PS-75/473 (NTIS/PS-78/0896/7; NTIS/PS-77/0710; NTIS/PS-76/0589; NTIS/PS-75/473) Avail: NTIS HC $28.00/MF $28.00 CSCL 20E

Citations on theory, design, operation, output, and diagnostics of CO2 lasers are presented. Studies relating to excitation, frequency conversion, modulation, laser pumping, reaction kinetics, gas dynamics, and plasmas are included. The development and efficiency of optical components, such as mirrors, resonators, tuning devices, infrared optical materials, amplifiers, and gratings are also discussed. (This updated bibliography contains 225 abstracts, 81 of which are new entries to the previous edition.) GRA

N78-33441# National Technical Information Service, Springfield, Va.

NEODYMIUM YAG LASERS. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Apr. 1978

Mona F. Smith Aug. 1978 156 p

(NTIS/PS-78/0808/2) Avail: NTIS HC $28.00/MF $28.00 CSCL 20E

Federally funded research reports on lasing of neodymium doped yttrium aluminum garnet are cited. Studies on design, fabrication, quantum efficiency, light pulses, stabilization, and testing are covered. Optical pumping, mode locking, frequency conversion, and modulation of these lasers are discussed. Laser applications such as optical communications, range finding, and tracking are included. Safety hazards and radiation damage related to neodymium YAG lasers are also covered. This bibliography contains 149 abstracts. GRA

N78-34029# Joint Publications Research Service, Arlington, Va.

LASER LIGHT SOURCE ILLUMINATING DEVICE DESIGN FEATURES DISCUSSED
V. V. Khvalovskiy, S. N. Natarovskiy, and V. I. Nalivayko *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 8-15 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Priborostr. (Leningrad), v. 21, no. 6, 1978 p 94-101 (For primary document see N78-34028 24-99)
Copyright. Avail: NTIS HC A04/MF A01

N78-34034# Joint Publications Research Service, Arlington, Va.
SOVIET LASER SPECTROSCOPY RESEARCH REVIEWED
V. Ketokhov *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 53-56 Transl. into ENGLISH from Izvestiya (Moscow), 19 Aug. 1978 p 3 (For primary document see N78-34028 24-99)
Avail: NTIS HC A04/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N78-33442 Purdue Univ., Lafayette, Ind.
ANALYSIS OF A HIGH SPEED RING VALVE SYSTEM FOR A SINGLE CYLINDER RECIPROCATING COMPRESSOR Ph.D. Thesis
Wanchai Pahnichaputt 1977 212 p
Avail: Univ. Microfilms Order No. 78-13100

The theoretical natural frequencies and mode shapes of the free-free valve ring were determined. These informations were then used to generate the theoretical natural frequencies and mode shapes of the spring supported ring valve by matching with the spring boundary conditions. Mode curves representing the relationship between the natural frequency and spring constant for the various modes of vibration of the spring supported ring valve were also developed. An analytical model of a discharge valve system which had a pocket behind the spring supported ring valve was derived. The model was obtained in terms of several differential equations. The effects of the pocket on the dynamics of the valve were determined by comparing the results from the simulation of the discharge valve system which had a pocket to those of the discharge valve system without a pocket. Dissert. Abstr.

N78-33443 Wisconsin Univ. - Madison.
MECHANICAL SYSTEM IDENTIFICATION AND DECOMPOSITION BY DYNAMIC DATA SYSTEM METHODOLOGY Ph.D. Thesis
Eugenio Garcia-Gardea 1978 254 p
Avail: Univ. Microfilms Order No. 7811722

The effectiveness of the dynamic data system (DDS) methodology as a modeling technique is evaluated using simulation. Stochastic differential equations, representing second and third order systems with first order feedback are generated with the given parameters and the models are estimated and verified from the generated data using the DDS approach. In addition, an analytical study of the decomposition method was developed to physically interpret high order models which are often fitted to a mechanical system's data. Three systems, each of different complexity, were analyzed by the DDS methodology. These include a hydraulic tracer system, a machine tool dynamometer, and grinding process dynamics. Dissert. Abstr.

N78-33444*# Kansas Univ. Center for Research, Inc., Lawrence.
AN INVESTIGATION OF DRAG REDUCTION FOR TRACTOR TRAILER VEHICLES Final Report
Vincent U. Muirhead Oct. 1978 62 p refs
(Grant NsG-4009)
(NASA-CR-144877; KU-FRL-322-1) Avail: NTIS HC A04/MF A01 CSCL 13F

Force and moment data were obtained from a one-twenty-fifth scale wind tunnel model of a cab-over-engine tractor trailer combination. The tests define the aerodynamic characteristics of the baseline (unmodified) vehicle and several modified configurations. The primary modifications consist of: (1) greatly increased forebody corner radii, (2) a smooth fairing over the cab-to-trailer gap, (3) a smoothed underbody, and (4) rear streamlining (boattailing)of the trailer. Tests were conducted for yaw angles from 0 deg to 30 deg. The reduction in drag, relative to the baseline, obtained by combining the modifications are compared for the zero yaw condition with full scale coast down drag results for similar configurations. The drag reductions obtained from the model and full scale tests are in good agreement. Author

N78-33445*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE PRACTICAL IMPACT OF ELASTOHYDRODYNAMIC LUBRICATION
William J. Anderson 1978 14 p refs Presented at the 5th Leeds-Lyon Symp. on Tribology, Leeds, Engl., 19-22 Sep. 1978 (NASA-TM-78987; E-9766) Avail: NTIS HC A02/MF A01 CSCL 13I

The use of elastohydrodynamics in the analysis of rolling element bearings is discussed. Relationships for minimum film thickness and tractive force were incorporated into computer codes and used for bearing performance prediction. The lambda parameter (ratio of film thickness to composite surface roughness) was shown to be important in predicting bearing life and failure mode. Results indicate that at values of lambda below 3 failure modes other than the classic subsurface initiated fatigue can occur. B.B.

N78-33446*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TELESCOPING COLUMNS Patent Application
John T. Mazur, inventor (to NASA) (Harris Corp., Melbourne, Fla.) Filed 29 Sep. 1978 16 p Sponsored by NASA
(Contract NAS1-13943)
(NASA-Case-LAR-12195-1; US-Patent-Appl-SN-946991) Avail: NTIS HC A02/MF A01 CSCL 13I

A power operated telescoping column is described for the deployment and retraction of a large parabolic antenna for space applications. The column consists of several axially elongated rigid structural sections nested within one another. The outermost and each intermediate section includes several rotatable screws extended longitudinally. Sprockets, rigidly attached to the screws and interconnected by a chain, provide simultaneous rotation of the screws of a single section. Threaded legs are attached at the base end of the section and are oriented to engage the screws of the next outer section. The column is extended and retracted by selectively rotating the screws of the sections with a motor and engagement mechanism. As the screws of one section are rotated, the next inner section is extended or retracted. NASA

N78-33447*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MINIMUM FILM THICKNESS IN ELLIPTICAL CONTACTS FOR DIFFERENT REGIMES OF FLUID-FILM LUBRICATION
Bernard J. Hamrock and Duncan Dowson (Leeds Univ., Engl.) Oct. 1978 25 p refs
(NASA-TP-1342; E-9687) Avail: NTIS HC A02/MF A01 CSCL 11H

The film-parameter equations are provided for four fluid-film lubrication regimes found in elliptical contacts. These regimes are isoviscous-rigid; viscous-rigid; elastohydrodynamic of low-elastic-modulus materials, or isoviscous-elastic; and elastohydrodynamic, or viscous-elastic. The influence or lack of influence of elastic and viscous effects is the factor that distinguishes these regimes. The film-parameter equations for the respective regimes come from earlier theoretical studies by the authors on elastohydrodynamic and hydrodynamic lubrication of elliptical conjunctions. These equations are restated and the results are presented as a map of the lubrication regimes, with film-thickness contours on a log-log grid of the viscosity and elasticity parameters for five values of the ellipticity parameter. The results present a complete theoretical film-parameter solution for elliptical contacts in the four lubrication regimes. L.S.

N78-33448# Army Tank-Automotive Research and Development Command, Warren, Mich.

ULTRASONIC LUBRICATION
S. B. Catalano Oct. 1977 31 p refs
(DA Proj. 1T1-61101-A-91A)
(AD-A056050; TARADCOM-TR-12351) Avail: NTIS HC A03/MF A01 CSCL 21/7

This effort has resulted in a state-of-the-art survey. It involved literature search, conference attendance and meeting with workers and leaders in the fields of ultrasonic lubrication and adiabatic engines. Because of the infancy of both of these fields it appears premature at this time to try to utilize ultrasonic lubrication in the combustion chamber of the adiabatic engine. However, this work includes two suggested adiabatic engine design changes which may be employed presently if the need for ultrasonic lubrication of the combustion chamber of the adiabatic engine becomes sufficiently urgent. Author (GRA)

N78-33449# Douglas Aircraft Co., Inc., Long Beach, Calif.
INTERACTIVE COMPOSITE JOINT DESIGN. PART 2: USER'S MANUAL Final Technical Report, Apr. 1976 - Apr. 1978
M. K. Smith, L. J. Hart-Smith, and C. G. Dietz Apr. 1978 94 p
(Contract F33615-76-C-3058)
(AD-A056712; MDC-J7908-Pt-2; AFFDL-TR-78-38-Pt-2) Avail: NTIS HC A05/MF A01 CSCL 13/5

A computing technique was developed to determine the feasibility of combining the several batch computer programs for the analysis of composite joints into one interactive computer program utilizing graphics display. This approach proved successful and produced a design tool for the analysis of bolted or bonded composite joints. The program utilizes the software package provided by TEKTRONIX for the graphics display. The user works at the remote on-line graphics terminal in conjunction with the main computing facilities which contain the program. The final report discusses the summary, conclusion, and recommendations of the work performed. The User's Manual and Programming Manual discuss the input, output, and function of the program. Author (GRA)

N78-33450# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Chemical Systems Lab.
INVESTIGATION INTO THE EFFECTS OF WEAPON SETBACK ON VARIOUS MATERIALS AND GEOMETRIES Technical Report, Mar. 1977 - Jan. 1978
Richard S. Simak Jul. 1978 35 p refs
(DA Proj. 1T1-61101-A-91A)
(AD-A057236; AD-E410043; ARCSL-TR-78038) Avail: NTIS HC A03/MF A01 CSCL 11/6

The objective of this task was to develop a method for estimating the mechanical behavior of various materials when subjected to weapon (e.g., howitzer) setback forces. A mathematical model was developed for predicting the dynamic mechanical behavior of the materials, from which predictions concerning certain material-geometry combinations were made. Tests were carried out with aluminum and steel specimens and the resultant data compared with results predicted by the mathematical model. The mathematical model selected was a viscoelastic model involving viscous, elastic, and in one instance, plastic parameters. This model accurately predicted the measured values in five material-geometry combinations actually tested. The methodology described in this report can be used to predict accurately the structural integrity of munition components when exposed to weapon setback environments. GRA

N78-33451# Alabama Univ. in Huntsville.
CONTAINER CUSHIONING DESIGN ENGINEER USERS MANUAL: CDC-6600 FORTRAN VERSION, VOLUME 2 Final Report, 8 Nov. 1977 - 7 Jun. 1978
Richard M. Wyskida and James D. Johannes Jun. 1978 78 p refs
(Contract DAAK40-77-C-0020)
(AD-A057245; UAH-RR-203-Vol-2; MIRADCOM-TG-CR-77-1-Vol-2) Avail: NTIS HC A05/MF A01 CSCL 20/11

Many of the military cushioning systems use some form of bulk cushioning material (e.g., plastic foam) as the cushion system. This provides a low-cost, lightweight cushioning system that is easily incorporated into the design; however, designers have some reservations concerning the use of bulk cushioning systems in the military. One limiting factor is the difficulty the designer has in predicting the response of bulk cushioning materials when subjected to the extreme environmental conditions encountered under military deployment. The temperature sensitivity of these cushioning materials, which causes variations in the impact response, is a primary concern. It was shown in a recent study of thermoplastic foam cushioning systems that temperature had a significant effect on cushion system response. Therefore, temperature effects must be factored into the design of cushion systems using bulk cushioning materials. GRA

N78-33452# Oak Ridge Y-12 Plant, Tenn.
COMPUTER AUTOMATION ON AN ELECTRON-BEAM WELDER WITH AUTOMATIC, STORED SEAM TRACKING
J. H. Burkhardt, Jr., G. L. Bowers, C. M. Davenport, P. C. Turner, and L. M. Greene 10 May 1978 45 p refs
(Contract W-7405-eng-26)
(Y-2114) Avail: NTIS HC A03/MF A01

A Hamilton Standard 7.5-kW electron beam welder was extensively rebuilt, upgraded, and computer automated to provide accurate, repeatable, multipass, wirefed welds with stored seam tracking. Tests showed that the seam tracking system can keep the beam on a true line within approximately plus or minus 0.05 millimeter, even in the presence of a strongly deflecting magnet. ERA

N78-33453# Oak Ridge Y-12 Plant, Tenn.
LASER-ERROR-CORRECTION CONTROL UNIT FOR MACHINE TOOLS
R. R. Burleson 23 May 1978 134 p
(Contract W-7405-eng-26)
(Y-2129) Avail: NTIS HC A07/MF A01

A precision air-bearing spindle was mounted horizontally on a modified vertical column of a Moore Number 3 measuring machine base located in a development laboratory at the Oak Ridge Y-12 Plant. A new controller was needed that could monitor the actual position of the machine and perform real-time error correction on the programmed tool path. It was necessary that this project: (1) attain an optimum tradeoff between hardware and software; (2) use a modular design for easy maintenance; (3) use a standard NC tape service; (4) drive the x and y axes with a positioning resolution of 5.08 nm and a feedback resolution of 10 nm; (5) drive the x and y axis motors at a velocity of 0.05 cm/sec in the contouring mode and 0.18 cm/sec in the positioning mode; (6) eliminate the possibility of tape-reader errors; and (7) allow editing of the part description data. The work that was done to develop and install the new machine controller is described. ERA

N78-33454# Massachusetts Inst. of Tech., Cambridge. Aeroelastic and Structure Research Lab.
STUDIES OF IMPACT-INDUCED RESPONSES OF A GENERIC CRUSHABLE-RIGID RODLIKE MISSILE AGAINST RIGID AND DEFORMABLE TARGETS
A. M. Lush and E. A. Witmer Sep. 1977 281 p refs
(Contract EX-76-C-01-2295-023)
(ASRL-TR-190-1) Avail: NTIS HC A13/MF A01

This study pertains to the analysis of ductile metallic panel protective structures which may be subjected to low speed impact by missiles of various types and deformabilities, such as steel rods, pipes, poles, rotor blades, rotor disk fragments, aircraft, etc. Since a definitive evaluation of the accuracy and adequacy of theoretical methods for predicting the transient responses of the subject protective structures requires theoretical-experimental comparisons with appropriate well-defined transient structural response data, laboratory experiments to obtain such data were devised and carried out. A generic crushable-rigid rodlike missile consisting of a solid cylindrical front portion of semirigid polyurethane foam and an aluminum afterbody was designed and tested. High-speed Fastax photographs of this missile with markings on both the foam portion and the aluminum afterbody documented the responses of this type of missile during perpendicular impact against (1) a flat rigid barrier and (2) the midspan of thin deformable aluminum beams with both ends ideally clamped. ERA

N78-33455# Department of Energy, Bartlesville, Okla. Energy Research Center.
PERFORMANCE CHARACTERISTICS OF AUTOMOTIVE ENGINES IN THE UNITED STATES. SECOND SERIES, REPORT NO. 1: 1976 CHEVROLET VEGA 140 (CID (2.3 LITERS), 2V Interim Report
T. W. Chamberlain, D. E. Koehler, K. R. Stamper, and W. F. Marshall Apr. 1978 62 p
(Contract DOT-RA-76-23)
(PB-281774/0; BERC/OP-77/47-1; DOT-TSC-NHTSA-78-2; DOT-HS-803-275) Avail: NTIS HC A04/MF A01 CSCL 21G

Experimental data were obtained in dynamometer tests of a 1976 Chevrolet Vega 2.3 liter, 140-CID engine to determine fuel consumption and emissions (hydrocarbon, carbon monoxide, oxides of nitrogen) at steady-state engine-operating modes. Engine-performance data are presented for estimating emissions and fuel economy for varied engine service and duty. Basic engine characteristic data required as input for engineering calculations involving ground transportation are provided. GRA

N78-33456# Department of Energy, Bartlesville, Okla. Energy Research Center.
PERFORMANCE CHARACTERISTICS OF AUTOMOTIVE ENGINES IN THE UNITED STATES. SECOND SERIES, REPORT NO. 2: 1976 CHEVROLET 305 CID (5.0 LITERS), 2V Interim Report, Aug. 1977
T. W. Chamberlain, D. E. Koehler, K. R. Stamper, and W. F. Marshall Apr. 1978 60 p refs
(Contract DOT-RA-76-23)
(PB-281775/7; BERC/OP-77/47-2; DOT-TSC-NHTSA-78-3; DOT-HS-803-276) Avail: NTIS HC A04/MF A01 CSCL 21G

Experimental data were obtained in dynamometer tests of a 1976 Chevrolet 305OCID V-8 engine to determine fuel comsumption and emissions (hydrocarbon, carbon monoxide, oxides of nitrogen) at steady-state engine-operating modes. Engine performance data for estimating emissions and fuel economy for varied engine service and duty are provide along with basic engine characteristic data required as input for engineering calculations involving ground transportation. GRA

N78-33457# Department of Energy, Bartlesville, Okla. Energy Research Center.
PERFORMANCE CHARACTERISTICS OF AUTOMOTIVE ENGINES IN THE UNITED STATES. SECOND SERIES, REPORT NO. 3: 1977 CHRYSLER 225 CID (3.7 LITERS), 2V Interim Report, Aug. 1977
T. W. Chamberlain, D. E. Koehler, K. R. Stamper, and W. F. Marshall Apr. 1978 62 p
(Contract DOT-RA-76-23)
(PB-281776/5; BERC/OP-77/48; DOT-TSC-NHTSA-78-4; DOT-HS-803-277) Avail: NTIS HC A04/MF A01 CSCL 21G

Experimental data were obtained in dynamometer tests of a 1977 Chrysler 225-CID engine to determine fuel consumption and emission (hydrocarbon, carbon monoxide, oxides of nitrogen) at steady-state engine-operating modes. Estimation of emissions and fuel economy for varied engine service and duty was emphasized. Engine data required as input for engineering calculations involving ground transportation are given. GRA

N78-33458# Department of Energy, Bartlesville, Okla. Energy Research Center.
PERFORMANCE CHARACTERISTICS OF AUTOMOTIVE ENGINES IN THE UNITED STATES. FIRST SERIES, REPORT NO. 12: 1975 PERKINS DIESEL 247 CID (4.0 LITERS), FI Interim Report
W. F. Marshall and K. R. Stamper Apr. 1978 36 p
(Contract DOT-RA-75-10)
(PB-281777/3; BERC/OP-77/28; DOT-TSC-NHTSA-78-5; DOT-HS-803-278) Avail: NTIS HC A03/MF A01 CSCL 21G

Experimental data were obtained in dynamometer tests of a 1975 Perkins 247-CID diesel engine to determine fuel consumption and emissions (hydrocarbon, carbon monoxide, oxides of nitrogen) at steady-state engine-operating modes. Emissions and fuel economy for varied engine service and duty are estimated. Basic engine characteristic data required as input for engineering calculations involving ground transportation are presented. GRA

N78-33459# Department of Energy, Bartlesville, Okla. Energy Research Center.
PERFORMANCE CHARACTERISTICS OF AUTOMOTIVE ENGINES IN THE UNITED STATES. FIRST SERIES, REPORT NO. 13: 1975 AMERICAN MOTORS, 258 CID (4.2 LITERS), 1V Interim Report, Jun. 1977
W. F. Marshall and K. R. Stamper Apr. 1978 38 p
(Contract DOT-RA-75-10)
(PB-281778/1; BERC/OP-77/28; DOT-TSC-NHTSA-78-5; DOT-HS-803-279) Avail: NTIS HC A03/MF A01 CSCL 21G

Experimental data were obtained in dynamometer tests of a 1975 AMC 258-CID production 1V engine to determine fuel consumption and emission (hydrocarbon, carbon monoxide, oxides of nitrogen) at steady-state engine-operating modes. Emissions and fuel economy are estimated for varied engine service and duty. Basic engine characteristic data required as input for engineering calculations involving ground transportation are given. GRA

N78-33460# National Technical Information Service, Springfield, Va.
INERT GAS WELDING, VOLUME 2. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1974 - 1976
William E. Reed Aug. 1978 224 p
(NTIS/PS-78/0904-Vol-2) Avail: NTIS HC $28.00/MF $28.00 CSCL 13H

This bibliography cites worldwide research reports on various techniques and procedures for inert gas and gas tungsten arc welding. Other topics include process control, automation, and applications. The characteristics of welded steel, aluminum, copper, titanium, and cast iron are also discussed. (This updated bibliography contains 218 abstracts, none of which are new entries to the previous edition. A.R.H.

N78-33461# National Technical Information Service, Springfield, Va.
INERT GAS WELDING, VOLUME 3. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1977 - Jul. 1978
William E. Reed Aug. 1978 97 p Supersedes NTIS/PS-77/0767; NTIS/PS-76/0726
(NTIS/PS-78/0905/6; NTIS/PS-77/0767; NTIS/PS-76/0726) Avail: NTIS HC $28.00/MF $28.00 CSCL 13H

Reports from worldwide research are cited which deal with the development of techniques and procedures for inert gas welding and with the characteristics of the resulting welds. Process control, automation, and applications are also covered. Metals welded include steel, titanium, aluminum, copper, and cast iron. (This updated bibliography contains 92 abstracts, 42 of which are new entries to the previous edition.) GRA

N78-33462# National Technical Information Service, Springfield, Va.
INERT GAS WELDING. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jul. 1978
William E. Reed Aug. 1978 209 p Supersedes NTIS/PS-77/0766; NTIS/PS-76/0724; NTIS/PS-75/764
(NTIS/PS-78/0903/1; NTIS/PS-77/0766; NTIS/PS-76/0724; NTIS/PS-75/764) Avail: NTIS HC $28.00/MF $28.00 CSCL 13H

The Federally-sponsored research reports cited deal with the development of techniques and procedures for inert gas welding and with the characteristics of the resulting welds. Process control, automation, nondestructive testing, and health hazards are also investigated. Metals welded include steel, titanium, aluminum, uranium, and refractory metals. (This updated bibliography contains 203 abstracts, 14 of which are new entries to the previous edition.) GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N78-33463*# General Electric Co., Cincinnati, Ohio. Material and Process Technology Labs.

ROLLING ELEMENT FATIGUE TESTING OF GEAR MATERIALS Final Report, Apr. 1977 - Jun. 1978

A. H. Nahm 26 Jul. 1978 124 p refs

(Contract NAS3-14302)

(NASA-CR-135450; R78AEG476) Avail: NTIS HC A06/MF A01 CSCL 14D

Rolling element fatigue lives of nine alloys were evaluated in Rolling Contact (RC) rigs. Test conditions included a Hertzian stress at 4,826 MPa (700 ksi), a rolling speed of 6.23 m/sec (245 in/sec.). Tests were run with a Type I oil (MIL-L-7808G) at room temperature. B-10 lives (10% failure rate) of alloys were compared versus reference alloys, VIM-VAR AISI M-50 and VAR AISI 9310. Six case carburizing alloys (AISI 9310, CBS600, CBS1000M, EX00014, Vasco X-2 and EX00053) and three through-hardening alloys (AISI M-50, VascoMax 350 and Vasco Matrix 2 evaluated, showed RCF performance inferior or equivalent to that of AISI 9310 and AISI M-50. It was also found that the effects of vacuum melting processes, different tempering temperatures, freezing cycle during heat treating, shot peening, gold plating and chrome plating employed in the present investigation did not significantly affect RCF life. G.Y.

N78-33464# Southwest Research Inst., San Antonio, Tex. Instrumentation Research Div.

ENGINEERING SERVICES TO DETERMINE ACCEPTANCE LIMITS OF ULTRASONIC TRANSDUCERS FOR NONDESTRUCTIVE INSPECTION Final Engineering Report

V. Devon Smith, Cecil M. Teller, and Robert K. Swanson Jun. 1978 69 p refs

(Contract F41608-77-C-1381)

(AD-A056648) Avail: NTIS HC A04/MF A01 CSCL 14/2

Electrical, ultrasonic, and flaw response performance were characterized for 23 ultrasonic transducers used by the Air Force to inspect aircraft components. Wide variation was noted in the response of these transducers to sample flaws, including a flat-bottom hole, an Elox notch, and two laboratory generated fatigue cracks. Seventeen parameters descriptive of the characteristics of these transducers were defined and correlations between these parameters and the flaw detection performance analyzed. Good correlation between loop sensitivity and ability to detect the sample flaws was shown for each transducer in the set. Other parameters of significance appear to be transducer center frequency, beamwidth spectrum inflection, and beam inflection. Definitions of these parameters are presented. A performance rating based on the significant parameters was developed, and, on the basis of this rating, only two of the 23 transducers were judged to be good and eleven fair. In the case of fatigue cracks the response of individual transducers ranged from signals several times the noise background permitting easy crack detection and a transducer rating of good to no signal which means the crack would not be detected and a transducer rating of poor. GRA

N78-33465# George Washington Univ., Washington, D. C. Inst. for Management Science and Engineering.

ESTIMATION AND TESTING OF HYPOTHESES FOR DISTRIBUTIONS IN ACCELERATED LIFE TESTS

J. Sethuraman and Nozer D. Singpurwalla 5 May 1978 22 p refs

(Contract N00014-77-C-0263; Grant DAAG29-76-G-0238; NR Proj. 042-372)

(AD-A056096; Serial-T-374) Avail: NTIS HC A02/MF A01 CSCL 12/1

In this paper, a procedure is presented for the interference from accelerated life tests without assuming a parametric family of failure distributions at the different stress levels. The time transformation function is a generalization of the familiar inverse power law relationship. The failure distribution at use conditions stress, as consistently estimated, and testing for a specified common parametric family for the life distribution under different stresses was shown. The procedures are illustrated by considering some failure data from an industrial accelerated life test. The results should be of interest to biometricians involved with experiments of carcinogenic substances. GRA

N78-33466# George Washington Univ., Washington, D. C. Inst. for Management Science and Engineering.

THE GINI INDEX, THE LORENZ CURVE, AND THE TOTAL TIME ON TEST TRANSFORMS

Mahesh Chandra and Nozer D. Singpurwalla 17 Feb. 1978 29 p refs

(Contract N00014-77-C-0263)

(AD-A056095; Serial-T-368) Avail: NTIS HC A03/MF A01 CSCL 14/4

This note points out the connection between some well-known indicators used in economics and a central concept in reliability theory. In particular, the Lorenz curve and the Gini index are shown to relate to the total time on test transform and the cumulative total time on test transform, respectively. Thus, the recently proposed tests for exponentiality based on the Gini statistic inherit the properties of the tests for exponentiality based on the cumulative total time on test statistic. GRA

N78-33467# Pennsylvania State Univ., University Park. Dept. of Architectural Engineering.

CONSTRUCTION QUALITY CONTROL SYSTEMS: A COMPARATIVE ANALYSIS M.S. Thesis

Scot H. Shepard Nov. 1977 138 p refs

(AD-A056334) Avail: NTIS HC A07/MF A01 CSCL 13/3

Traditionally, construction quality control has been characterized by lack of planning, little management support, and an emphasis on inspection to detect construction errors. In the early 1970's, three quality control systems were developed which consider quality control during all phases of a construction project, and which emphasize the prevention of construction errors. The three systems are highway construction statistical quality control, nuclear power plant construction quality assurance, and U.S. Navy contractor quality control. A comparative analysis of these systems and building construction quality control, which represents the traditional approach, is provided. Each approach to quality control is analyzed according to its planning, procedures, and organization and management aspects. The comparative analysis provides an overview of construction quality control, and a set of management tools available to any owner contemplating a construction project. Author (GRA)

N78-33468# Systems Research Labs., Inc., Dayton, Ohio. Research Applications Div.

EXPLORATORY DEVELOPMENT OF NONDESTRUCTIVE EVALUATION TECHNIQUES Final Report, 15 Mar. 1976 - 15 Nov. 1977

Joseph A. Moyzis and J. Montgomery Raney Wright-Patterson AFB, Ohio AFML Mar. 1978 75 p refs

(Contract F33615-76-C-5313; AF Proj. 7351)

(AD-A057200; SRL-6906; AFML-TR-78-13) Avail: NTIS HC A04/MF A01 CSCL 11/6

In the first part of the contract, work was performed on the frequency-domain analysis of ultrasonic signals and radiographic images derived from the detection of fatigue cracks in multilayer adhesively bonded structures. Fatigue cracks in a single layer and adhesively bonded double layers were detected by use of Fourier-transform analysis of the ultrasonic signals obtained during conventional longitudinal wave inspection of these structures. Parallel efforts to quantify the radiographic inspection procedure were also begun. GRA

N78-33469# Battelle Columbus Labs., Ohio.

NONDESTRUCTIVE EVALUATION OF STEAM TURBINE ROTORS: AN ANALYSIS OF THE SYSTEMS AND TECHNIQUES UTILIZED FOR INSERVICE INSPECTION Interim Report

M. J. Golis and S. D. Brown Apr. 1978 74 p refs Sponsored by EPRI

(EPRI-NP-744) Avail: NTIS HC A04/MF A01

The discontinuities present in large steam turbine rotor forgings and their growth during service are of major concern since failures of these rotors are extremely expensive both in potential loss of lives and revenues. The current inservice inspections of these rotors are thus a significant part of the quality control programs of electric utilities to assure the safe and continued operation of power generating stations. The nature of the NDE processes now being used for rotor inspection and the types of internal indications which are considered technically relevant, from a stress distribution viewpoint are reviewed, and recommendations are made of where rotor examinations can be

improved. In particular, the details of boresonic examination procedures are reviewed and the most probable causes of routine inspection uncertainties are identified. Minimum flaw sensitivities are described and the probabilities of detection, based on boresonic axial scan patterns are identified in terms of the measured beam profiles of typical inspection transducers. ERA

N78-33470# Michigan Univ., Ann Arbor. Dept. of Mechanical Engineering.
IMPROVED ULTRASONIC NONDESTRUCTIVE TESTING OF PRESSURE VESSELS Annual Report, 1 Oct. 1976 - 30 Sep. 1977
J. R. Frederick, C. J. J. Vandenbroek, R. C. Fairchild, and M. B. Elzinga May 1978 161 p refs
(Contract NRC-04-75-182)
(PB-282170/0; NUREG-CR-0135) Avail: NTIS HC A08/MF A01 CSCL 14B

Test results and methods development for a synthetic aperture focusing technique for ultrasonic pulse-echo flaw evaluation are described. Verification of the system's flaw-imaging capability is presented in the form of test results from several different test samples. The development of improved data processing and display techniques are also described. GRA

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N78-33471 Virginia Polytechnic Inst. and State Univ., Blacksburg.
AN EXPERIMENTAL STUDY OF THE CRACKED NOZZLE PROBLEM OCCURRING IN PRESSURE VESSELS Ph.D. Thesis
Walter Hamilton Peters, III 1978 53 p
Avail: Univ. Microfilms Order No. 78-14043

The experimental technique of stress freezing photoelasticity is applied to the pressure vessel nozzle corner crack problem. The technique is shown to yield crack shapes which have good correlation with those grown in fatigue. In addition, the method gives the stress intensity factor distributions around these crack fronts. The technique is applied to three different nozzle-vessel geometries and comparisons of the results of the three geometries are given. Implications of results for numerical analysts and designers is presented. Dissert. Abstr.

N78-33472 Missouri Univ. - Columbia.
BUCKLING OF REINFORCED CONCRETE SPHERICAL SHELLS Ph.D. Thesis
Mallela Ramaiah 1977 145 p
Avail: Univ. Microfilms Order No. 78-14136

The problem of buckling of reinforced concrete spherical shells was studied using the von Karman and Tsien energy approach and Buchert slope function. Both the elastic and plastic states of strain were considered and the concept of cracked sections was introduced. The total energy of the buckled segment was calculated on the basis of assumed initial values of coefficients in the expressions for the angle of buckle and the buckling load. The final values of these coefficients were obtained by successive approximation by following an iterative procedure in which the energy was minimized and the resulting values of the coefficients were compared with the previous values till two successive values agreed within specified tolerance limits. A computer program was prepared for a speedy solution of the problem. Dissert. Abstr.

N78-33473 Michigan Univ., Ann Arbor.
THE YIELD LOCUS AS A FUNCTION OF TEMPERATURE FOR ORIENTED AND UNORIENTED POLYCARBONATE AND POLYPROPYLENE Ph.D. Thesis
Alan Ronald Woodliff 1978 160 p
Avail: Univ. Microfilms Order No. 78-13762

The applicability of two previously proposed yield criteria (isotropic and anisotropic) for polymers was investigated over a range of testing temperatures for both oriented and unoriented polycarbonate (PC) and polypropylene (PP). A thermostatically controlled environmental chamber enable specimens to be loaded by 500 kg Instron machine over a temperature range from -50 C to 100 C. Uniaxial compressive and tensile tests were run to define a theoretical two-dimensional yield locus for each material-temperature combination. Thin-walled tubes were simultaneously loaded axially in compression or tension and pressurized internally with silicone oil to produce experimental yield points in the tension-tension and compression-tension quadrants of the yield locus. Dissert. Abstr.

N78-33474 California Univ., Berkeley.
STRENGTH AND DEFORMATION ANALYSIS OF CONCRETE UNDER MULTIAXIAL STRESSES Ph.D. Thesis
Mohamad Ahmad Salah Eldin Elsayed Yousef 1977 143 p
Avail: Univ. Microfilms Order No. 7812836

A discretized, constitutive model is presented for the analysis of concrete subjected to general states of stress. Applications of the model are demonstrated by analyzing five case studies of short, hoop reinforced concrete columns, uniformly compressed along their axes. Computer programs were developed primarily to implement the proposed model in the analysis of such examples using finite element techniques. The load-deflection relationships of the concrete columns obtained from the analysis closely followed the data obtained from an experimental study on columns made from ordinary weight concrete as well as lightweight concrete, each with two different hoop reinforcements. Stress distributions obtained analytically were used to suggest mechanisms governing failure for the various cases studied. Dissert. Abstr.

N78-33475 Polytechnic Inst. of New York.
HIGH FREQUENCY BEHAVIOR OF SOURCE EXCITED CONCAVE SURFACES Ph.D. Thesis
Toyohiko Ishihara 1978 138 p
Avail: Univ. Microfilms Order No. 78-16751

Alternative representations for the high frequency surface field excited on a perfectly conducting concave circular cylinder by an axial magnetic line current located on the surface are analyzed. Included are ray optical, canonical integral, whispering gallery mode and near field formulations, and various combinations of these. The analysis is extended to the case of non-vanishing surface impedance. Alternative field representations are formulated and evaluated asymptotically. The analysis is also extended to point source excitation. Alternative field representations in terms of geometric optical contributions, whispering gallery modes, and canonical integrals are explored. A canonical integral occurring in the theory of wave propagation along a concave cylindrical impedance surface is evaluated numerically and tabulated. Dissert. Abstr.

N78-33476 Catholic Univ. of America, Washington, D. C.
AN INVESTIGATION OF THE ORTHOGONAL COLLOCATION METHOD WITH APPLICATIONS TO SOME STRUCTURAL MECHANICS PROBLEMS Ph.D. Thesis
Darrell Alan Milburn 1978 138 p
Avail: Univ. Microfilms Order No. 78-16876

The relationship between Galerkin's method and orthogonal collocation is investigated. Numerical quadrature formulas for evaluating the definite integrals of Galerkin's method are derived. A set of algebraic equations describing the equivalence of the two methods is obtained. The nature of the error terms is examined in regard to increasing the precision of the quadrature, and the convergence of the quadrature process. New features of the orthogonal collocation method; one of which concerns the orthogonality conditions used to select collocation points are shown. Orthogonal collocation and Galerkin's method are applied to one-dimensional eigenvalue problems and also to two dimensional boundary-value problems. A study of an engineering problem: the dynamic response of an infinite beam on a nonlinear elastic foundation to a moving load is presented. Dissert. Abstr.

N78-33477 Kentucky Univ., Lexington.
OPTIMUM FATIGUE RESISTANT FRAMES FOR RANDOM BASE EXCITATION Ph.D. Thesis
Terence Allan Wiegel 1978 162 p

Avail: Univ. Microfilms Order No. 7815767

An attempt was made to minimize the structural damage the building experiences by redistributing the frame material from some initial design. The total structural material used was held constant so as to provide a finite frame design in the optimum state. Since an earthquake was a random process, the frame response to such an earthquake was treated not only as a dynamic, but also as a probabilistic process. Modeling the earthquake as a nonstationary Gaussian shot noise yielded a system of dynamic equations, the solution vector of which formed a Markov process. The frame was assumed to respond in a linear fashion and, therefore, the solution vector must be Gaussian in nature, being completely described by its covariance and mean value matrices. The covariance and mean value matrices of the frame displacements were obtained by satisfying the Fokker-Planck equation, a requirement for all Markov processes. Dissert. Abstr.

N78-33478*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.

EVALUATION OF CYCLIC BEHAVIOR OF AIRCRAFT TURBINE DISK ALLOYS Final Report, Jun. 1976 - 1978

V. Shahani and H. G. Pop Jun. 1978 202 p refs

(Contract NAS3-20368)

(NASA-CR-159433) Avail: NTIS HC A10/MF A01 CSCL 20K

An evaluation of the cyclic behavior of three aircraft engine turbine disk materials was conducted to compare their relative crack initiation and crack propagation resistance. The disk alloys investigated were Inconel 718, hot isostatically pressed and forged powder metallurgy Rene '95, and as-hot-isostatically pressed Rene '95. The objective was to compare the hot isostatically pressed powder metallurgy alloy forms with conventionally processed superalloys as represented by Inconel 718. Cyclic behavior was evaluated at 650 C both under continuously cycling and a fifteen minute tensile hold time cycle to simulate engine conditions. Analysis of the test data were made to evaluate the strain range partitioning and energy exhaustion concepts for predicting hold time effects on low cycle fatigue. Author

N78-33479*# Sperry Support Services, Huntsville, Ala.

CREATION OF LUMPED PARAMETER THERMAL MODEL BY THE USE OF FINITE ELEMENTS

Oct. 1978 210 p refs

(Contract NAS1-14999)

(NASA-CR-158944) Avail: NTIS HC A10/MF A01 CSCL 20K

In the finite difference technique, the thermal network is represented by an analogous electrical network. The development of this network model, which is used to describe a physical system, often requires tedious and mental data preparation and checkout by the analyst which can be greatly reduced through the use of the computer programs to develop automatically the mathematical model and associated input data and graphically display the analytical model to facilitate model verification. Three separate programs are involved which are linked through common mass storage files and data card formats. These programs are SPAR, CINGEN and GEOMPLT, and are used to (1) develop thermal models for the MITAS II thermal analyzer program; (2) produce geometry plots of the thermal network; and (3) produce temperature distribution and time history plots. A.R.H.

N78-33480*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

STRUCTURAL EFFICIENCY OF LONG LIGHTLY LOADED TRUSS AND ISOGRID COLUMNS FOR SPACE APPLICATIONS

Martin M. Mikulas, Jr. Jul. 1978 54 p refs

(NASA-TM-78687) Avail: NTIS HC A04/MF A01 CSCL 20K

The general mass characteristics of long lightly loaded columns for space applications are investigated by studying four column concepts. The first is a simple tubular column, the second is a three longeron truss column constructed of tubular members, the third is a three longeron truss column constructed of solid rod members, and the fourth is an open grid work isogrid wall tubular column. Design procedures, which include an initial imperfection in the straightness of the column, are developed for the different concepts and demonstrated numerically. A new set of structural efficiency parameters are developed for lightly loaded columns and are used to show a comparison of the masses of the four column concepts investigated. Author

N78-33481*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Coll. of Engineering.

ANALYSIS OF GRAPHITE/POLYIMIDE RAIL SHEAR SPECIMENS SUBJECTED TO MECHANICAL AND THERMAL LOADING

Terry A. Weisshaar and Ramon Garcia Oct. 1978 58 p refs

(NASA-CR-157769; IR-14; VPI-E-78-27) Avail: NTIS HC A04/MF A01 CSCL 20K

A two-dimensional, linear-elastic, finite element analysis of selected graphite/polyimide rail shear test specimens is reported. The study includes the analysis of mechanical loading and the effect of heating the specimen to a uniform temperature. The presence of specimen free edges and their influence on the accuracy of the rail shear test is discussed. Parameters in this analysis include the length-to-width ratio of the specimen and the ply layup for symmetric, balanced laminates. Results presented include shear and normal stress distributions and the deflection behavior of various specimens caused by the mechanical loading and elevated temperature. G.G.

N78-33482# Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Mechanical and Industrial Engineering.

AUTOMATED RESIZING OPTIMIZATION OF GENERALLY LOADED PLANAR FRAMES VIA LINEAR PROGRAMMING TECHNIQUES Technical Report, Oct. 1977 - Jun. 1978

D. O. Calafell, II and K. D. Willmert Jun. 1978 13 p refs

(Contract N00014-76-C-0064)

(AD-A056567; MIE-027) Avail: NTIS HC A02/MF A01 CSCL 13/13

An automated, simple to use, efficient linear optimization method for planar generally loaded frames is presented. In the technique, formal analyses of the structure are avoided; instead, an equality and inequality constrained linear system of equations describes the structure. The optimal design is determined by solving a sequence of linear programming problems. The solution scheme employs new pivoting techniques to bypass Phase I of the simplex method. Two examples are presented and results are compared with previous research and a standard nonlinear method. These demonstrate the speed, effectiveness, and validity of this approach. Author (GRA)

N78-33483# Lockheed-California Co., Burbank.

FLAW GROWTH IN COMPLEX STRUCTURE. VOLUME 1: TECHNICAL DISCUSSION Final Report, 12 May 1975 - 12 Sep. 1977

T. R. Brussat, S. T. Chiu, and M. Creager Dec. 1977 309 p refs

(Contract F33615-75-C-3093)

(AD-A056372; LR-28272-Vol-1; AFFDL-TR-77-79-Vol-1) Avail: NTIS HC A14/MF A01 CSCL 13/5

Fatigue crack growth testing and analysis were conducted to evaluate the effects of initial flaw location and multiplicity on fatigue crack growth life and element failure sequence in multiple element, mechanically fastened metallic structure. The test program, which included 68 precracked structural specimens consisting of 26 joints and 42 stringer-reinforced panels, is described in detail. Stress intensity factor analyses and stress severity factor equations and the results of baseline static, fatigue, crack growth, and fracture tests are presented for use in making crack growth predictions for the structural specimens. Procedures are described for machining, precracking, assembling and testing the structural specimens. The test results and corresponding analytical results are presented and compared. GRA

N78-33484# Del West Associates, Inc., Woodland Hills, Calif.

DEVELOPMENT OF A CRACK GROWTH RATE TEST FOR QUALITY CONTROL Final Technical Report, Apr. 1975 - Jun. 1977

M. Creager and A. W. Sommer Nov. 1977 130 p

(Contract F33615-75-C-5106)

(AD-A056373; DW9-30; AFML-TR-77-193) Avail: NTIS HC A07/MF A01 CSCL 20/11

A test method has been developed which reliably and inexpensively provides the fatigue crack growth rate of a material sample at any given stress intensity level. The method employs

a notched three point bend bar, typically 4 i/4 in. x 1/2 in. x 1/4 in., in a controlled displacement amplitude test mode. The specimen/test system is configured such that a constant stress intensity amplitude exists over the central region of the test specimen. Due to the unique attributes of a displacement controlled constant K test specimen, no visual or COD measurements of crack length are required for the crack growth rate measurement. An autographic record of load amplitude versus cycles exhibits a straight line portion, the slope of which provides a measurement of the central region crack growth rate. The test is simple enough so that a well trained quality control laboratory technician can perform it employing about one hour of his time to set it up, run the test and analyze the result. Capability has been demonstrated by comparing the results of 137 tests using the newly developed method with crack growth rate data generated employing compact tension geometry samples. GRA

N78-33485# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Ballistics Research Lab.

YOUNGDAHL STRESS FUNCTIONS AND QUASI-STATIC NONAXISYMMETRIC THERMAL STRESSES IN A FINITE CYLINDER Final Report

Ennis F. Quigley Jun. 1978 43 p refs
(DA Proj. 1W1-62118-AH-75)
(AD-A057196; AD-E430067) Avail: NTIS HC A03/MF A01 CSCL 20/11

The Youngdahl cylindrical stress functions were used to derive the analytical expressions for the quasi-static thermal stress fields in a isotropic, homogeneous, finite solid cylinder whose lateral surface was heated by a nuclear thermal environment. Because the derived axial stress equation did not satisfy the boundary conditions on the ends of the cylinder, the use of these functions in solving the Navier displacement equation did not result in an exact solution for the thermal stresses. These functions did, however, provide a plane strain solution for regions away from the ends of the cylinder. Author (GRA)

N78-33486# Northwestern Univ., Evanston, Ill. Dept. of Materials Science.

GEOMETRICAL PROBLEMS WITH A POSITION SENSITIVE DETECTOR EMPLOYED ON A DIFFRACTOMETER, INCLUDING ITS USE IN THE MEASUREMENT OF STRESS

Michael R. James and Jerome B. Cohen 16 Jun. 1978 29 p refs
(Contract N00014-75-C-0580)
(AD-A056662; TR-20) Avail: NTIS HC A03/MF A01 CSCL 14/2

Defocusing errors associated with the use of a straight one-dimensional position sensitive detector on a powder diffractometer are examined. At high angles, the error is less than the resolution of currently available detectors for X-rays. Author (GRA)

N78-33487# Southwest Research Inst., San Antonio, Tex.

CRACK TIP PLASTICITY ASSOCIATED WITH CORROSION-ASSISTED FATIGUE Interim Report, Jun. 1977 - Jun. 1978

D. L. Davidson 31 May 1978 38 p refs
(Contract N00014-75-C-1038; NR Proj. 036-109)
(AD-A056860; SWRI-02-4268) Avail: NTIS HC A03/MF A01 CSCL 11/6

The experimentally measured subgrain size distribution caused by the propagation of a fatigue crack through Fe - .05C steel has been used to calculate: (1) stress range distribution around the crack tip; (2) strain range distribution near the crack; (3) the effect of a water vapor environment on the stress range and strain range distributions; (4) the effect of a water vapor environment on the energy required to form a unit area of new crack surface; and (5) the effect of cyclic stress intensity factor (delta K) on the above variables. Throughout the development of the above results, an effort has been made to correlate the results of other investigators with the present experimental findings, and to present unifying concepts. The mechanism of fatigue crack propagation in an inert environment is given, and the effect of water vapor on that mechanism is described. Author (GRA)

N78-33488# Sandia Labs., Albuquerque, N. Mex.

LAGRANGIAN FINITE-DIFFERENCE CALCULATIONS OF AN EXPLOSION IN A PARTIALLY WATER-FILLED RIGID CYLINDRICAL TANK

J. W. Swegle Apr. 1978 77 p refs
(Contract EY-76-C-04-0789)
(SAND-77-1394) Avail: NTIS HC A05/MF A01

Calculations using the Lagrangian finite difference code, TOODY were performed for the problem of an explosion in a partially water-filled rigid cylindrical tank. Experimental data for this problem formed the basis of comparison for one of a series of test problems designed to validate codes used to model reactor blowdown situations. The calculations presented show effects of zoning variations on calculational results. ERA

N78-33489# Electric Power Research Inst., Palo Alto, Calif. Systems and Materials Dept.

EPRI DUCTILE FRACTURE RESEARCH REVIEW DOCUMENT

T. Marston Feb. 1978 201 p refs
(EPRI-NP-701-SR) Avail: NTIS HC A10/MF A01

The ductile fracture research currently sponsored by the Electric Power Research Institute (EPRI) is described, beginning with the need for such research, through the definition of goals and objectives, establishing strategy for reaching those goals, accomplishments, issues and future research. The need for such research is related to the need to define accurately the effect of flaws (either real or hypothetical) on the burst resistance of nuclear pressure vessels, particularly the reactor vessel. Analytical tools that are capable of dealing with the tough, ductile materials characteristic of the reactor vessel are being developed. ERA

N78-33490# Oak Ridge National Lab., Tenn.

ROOM-TEMPERATURE INELASTIC TEST OF A NOZZLE-TO-SPHERICAL-SHELL MODEL SUBJECTED TO PRESSURE AND MOMENT LOADING

R. C. Gwaltney, M. Richardson, and R. L. Battiste Apr. 1978 36 p refs
(Contract W-7405-eng-26)
(ORNL/TM-6170) Avail: NTIS HC A03/MF A01

The measured room-temperature elastic-plastic response is presented for a nozzle attached to a spherical shell that was subjected to an internal pressure loading and a cyclic moment applied to the nozzle. The test was performed to qualify the facility and provide experimental benchmark problem data suitable for assessing inelastic analysis methods and validating structural analysis computer programs. The nozzle-to-sphere model is representative of geometries encountered in design because it exhibits the essential features of inelastic behavior of nozzle attachments in pressure vessels. The specimen was machined from a well-characterized heat of type 304 stainless steel, and all tests were performed at a temperature of 21 C (70 F). Test results are presented in terms of loads and strains that typify the overall structural behavior. ERA

N78-33491# California Univ., Livermore. Lawrence Livermore Lab.

COMPUTER SIMULATION OF PLASTIC DEFORMATION IN THE CHARPY V-NOTCH IMPACT TEST

D. M. Norris, Jr., D. F. Quinones, and B. Moran 7 Mar. 1978 7 p refs Presented at the Symp. What Does the Charpy Test Really Tell Us, Denver, 26 Feb. 1978 - 2 Mar. 1978
(Contract W-7405-eng-48)
(UCRL-80868; Conf-780213-5) Avail: NTIS HC A02/MF A01

Calculations describe the dynamic stress and strain states in the standard Charpy specimen from impact to the start of cracking. The A533 Grade B Class 1 nuclear-pressure-vessel steel is modeled at 100 C with an elastic-plastic constitutive law. Large deformation and rotation of the material are accounted for. The specimen velocity field during the impact transient is presented and how the early wave effects cause separation of the specimen from the striker is shown. The calculations show why correlations between Charpy fracture energy and fracture toughness have been largely unsuccessful and suggest methods to improve these correlations using the same specimen geometry. ERA

N78-33492# California Univ., Livermore. Lawrence Livermore Lab.
STRESS-RUPTURE LIFE OF KEVLAR/EPOXY SPHERICAL PRESSURE VESSELS
R. H. Toland, R. J. Sanchez, and D. Freeman 31 Mar. 1978 28 p refs
(Contract W-7405-eng-48)
(UCID-17755-Pt-1) Avail: NTIS HC A03/MF A01

A study was conducted on the life of Kevlar/epoxy spherical pressure vessels subjected to a constant, sustained pressure in time until vessel failure; i.e., stress-rupture. Baseline data on the stress-rupture life of Kevlar/epoxy pressure vessels was generated and statistical reliability theory was applied to vessel and strand data to define vessel life statistics and reliability at given pressure (stress) levels. Vessel design, fabrication, and static burst performance, as well as the stress-rupture test plan and test facility are described. ERA

N78-33493# California Univ., Livermore. Lawrence Livermore Lab.
DYNAMIC RESPONSE OF A CYLINDRICAL SHELL IMMERSED IN A POTENTIAL FLUID Ph.D. Thesis
G. E. Cummings 18 Apr. 1978 147 p refs
(Contract W-7405-eng-48)
(UCRL-52464) Avail: NTIS HC A07/MF A01

A numerical solution technique is presented for determining the dynamic response of a thin, elastic, circular, cylindrical shell of constant wall thickness and density, immersed in a potential fluid. The shell may be excited by an arbitrary radial forcing function with a specified time history and spatial distribution. In addition, a pressure history may be specified over a segment of the fluid outer boundary. Any of the natural shell end conditions may be prescribed. A numerical instability prevented direct solutions where the ratio of the hydrodynamic forces to shell inertial forces is greater than two. This instability is beleived to be the result of the weak coupling between the equations describing the fluid to those describing the shell. To circumvent this instability, an effective mass was calculated and added to the shell. Comparisons of numerical to experimental results are made using a 1/22 scale model of a nuclear reactor core support barrel. ERA

N78-33494# Sandia Labs., Albuquerque, N. Mex.
TECHNIQUE FOR MEASUREMENTS OF PLANE WAVES OF UNIAXIAL STRAIN
R. A. Graham 1977 72 p refs Presented at the Workshop on Nonlinear Waves, Chicago, 21-23 Mar. 1977; sponsored by NSF and Illinois Univ.
(Contract EY-76-C-04-0789)
(SAND-77-0199C; Conf-770397-1) Avail: NTIS HC A04/MF A01

The measurement of plane waves in uniaxial strain, in which large surface areas are loaded and the measurements are restricted to a central region that is not influenced by lateral boundaries, is discussed. Measuring techniques are covered and instruments are discussed. ERA

N78-33495# Sandia Labs., Albuquerque, N. Mex.
PHYSICALLY-BASED INTERNAL VARIABLE MODEL FOR RATE-DEPENDENT PLASTICITY
R. D. Krieg, J. C. Swearengen, and R. W. Rohde 1978 14 p refs Presented at ASME/CSME Pressure Vessels and Piping Conf., Montreal, Canada, 25 Jun. 1978
(Contract EY-76-C-04-0789)
(SAND-78-0181C; Conf-780609-3) Avail: NTIS HC A02/MF A01

A unified model was developed for creep and plasticity in metals, using internal state variables to reflect the current microstructure. The inelastic flow rule was taken to be a power function incorporating a kinematic and an isotropic internal variable, where the microstructural origins of these properties were dislocation pileups and dislocation obstacle interaction, respectively. The model was generalized for three dimensional deformation, and evolutionary functions was developed for the internal variables to account for strain hardening and thermal recovery. An experimental test and data reduction procedure is presented which allows all the material constants to be determined for materials which exhibit secondary creep. The procedure was applied to pure aluminum. This generalized model provided a physical basis for predicting mechanical response along arbitrary deformation paths. ERA

N78-33496# Union Carbide Corp., Oak Ridge, Tenn. Nuclear Div.
CREEP-RECOVERY CONSTITUTIVE EQUATION AND ITS TIME-INDEPENDENT LIMIT
S. J. Chang 1978 25 p refs Presented at 94th Southeastern Conf. on Theoretical and Applied Mechanics, Nashville, Tenn. 4 May 1978
(Contract W-7405-eng-26)
(CONF-780540-1) Avail: NTIS HC A02/MF A01

The effect of strain recovery is taken into consideration in establishing a constitutive equation for metals at elevated temperatures. Internal state variables and Rice's flow potential are used in the representation. Growth law for the state variable is discussed and interpreted to be a more general form of the kinematic hardening condition. Yield condition is obtained from the flow law. Accordingly, the flow rule was established with the effect of the recovery mechanism, as a slightly general version of the time independent theory with the kinematic hardening rule. In the discussion of the time independent limit, the duration of time required for the inelastic strain to reach its saturated value was defined. ERA

N78-33497# Battelle Columbus Labs., Ohio.
RESIDUAL STRESSES AT WELD REPAIRS IN PRESSURE VESSELS Quarterly Progress Report, Dec. - Mar. 1978
E. F. Rybicki and R. B. Stonesifer Apr. 1978 44 p refs
(Contract AT(49-24)-0293)
(PB-281853/2; NUREG-CR-0078; QPR-2) Avail: NTIS HC A03/MF A01 CSCL 18J

Efforts focused on developing the temperature analysis model to better represent the weld repair conditions of pressure vessels. Progress on the finite element model included (1) a study of two iteration procedures to better handle the nonlinearities of the weld repair problem, (2) an application of the model, in its present state of development, to the weld repair problem, and (3) the initiation of a study on the through-the-thickness residual stresses. GRA

N78-33498# National Technical Information Service, Springfield, Va.
MATHEMATICAL ANALYSIS OF STRESS CRACKS, VOLUME 1. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1974 - Jun. 1978
Guy E. Habercom, Jr. Aug. 1978 323 p Supersedes NTIS/PS-77/0645; NTIS/PS-76/0554; NTIS/PS-75/467; COM-74-10242
(NTIS/PS-78/0768/8; NTIS/PS-77/0645; NTIS/PS-76/0554; NTIS/PS-75-467; COM-74-10242) Avail: NTIS HC $28.00/MF $28.00 CSCL 20K

Stress cracks are analyzed by mathematical methods, including extensive use of finite element analysis. Various materials, including metals, wood, composites, and rock are investigated. This updated bibliography contains 316 abstracts, 17 of which are new entries to the previous edition. GRA

42 GEOSCIENCES (GENERAL)

N78-33499*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DISCRIMINATION OF ROCK CLASSES AND ALTERATION PRODUCTS IN SOUTHWESTERN SAUDI ARABIA WITH COMPUTER-ENHANCED LANDSAT DATA
H. W. Blodget, F. J. Gunther (Computer Sciences Corp., Silver Spring, Md.), and M. H. Podwysocki Oct. 1978 40 p refs
(NASA-TP-1327; G7802-F16) Avail: NTIS HC A03/MF A01 CSCL 08G

Digital LANDSAT MSS data for an area in the southwestern Arabian Shield were computer-enhanced to improve discrimination of rock classes, and recognition of gossans associated with massive sulphide deposits. The test area is underlain by metamorphic

rocks that are locally intruded by granites; these are partly overlain by sandstones. The test area further includes the Wadi Wassat and Wadi Qatan massive sulphide deposits, which are commonly capped by gossans of ferric oxides, silica, and carbonates. Color patterns and boundaries on contrast-stretched ratio color composite imagery, and on complementary images constructed using principal component and canonical analyses transformations, correspond exceptionally well to 1:100,000 scale field maps. A qualitative visual comparison of information content showed that the ratio enhancement provided the best overall image for identification of rock type and alteration products. Author

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N78-33500 Oregon State Univ., Corvallis.
RELATIONSHIPS OF CLAY MINERALOGY TO LANDSCAPE STABILITY IN WESTERN OREGON Ph.D. Thesis
Ronald David Taskey 1978 234 p
Avail: Univ. Microfilms Order No. 78-11993

Clay fractions of soils from a large number of sites in Oregon's Western Cascades were characterized in order to determine the relationships of various clay materials to mass movements. Each site was either designated as stable or assigned to one or more of the following categories: debris avalanche, debris flow, slump earthflow, creep. All clay samples were analyzed by X-ray diffraction, and certain selected samples were analyzed by differential thermal analysis and/or electron microscopy. The more stable sites occur either at high elevations, with poorly formed soils having minimal clay development; or at low elevations, with relatively well drained soils containing kaolinite, dehydrated halloysite, chloritic integrades, and microaggregates bound by amorphous materials. Dissert. Abstr.

N78-33501 California Univ., Santa Cruz.
REGIONAL FLOOD ANALYSES AND LAND USE PLANNING IN AN AREA OF INADEQUATE DATA, SANTA CRUZ COUNTY, CALIFORNIA Ph.D. Thesis
Clement Fletcher Shearer 1978 217 p
Avail: Univ. Microfilms Order No. 78-13577

Methods used to compute regional flood frequency are analyzed. Major variations result from how the homogeneity of the hydrologic response of the region is determined, and how the stream flow data are extended to a common base period. Experimentation and theoretical considerations indicate that the historic record of Santa Cruz County streamflow is too short to yield accurate estimates by the graphical technique. The short record also introduces a strong bias to the stochastic estimates leading to results that are quite improbable. Differences in estimation of design floods and extent of inundation may seriously affect land-use planning decisions. Dissert. Abstr.

N78-33502 Virginia Univ., Charlottesville.
DETECTION AND LOCATION OF RESEAUX USING PICTORIAL PATTERN RECOGNITION Ph.D. Thesis
James Hiram Aylor 1977 133 p
Avail: Univ. Microfilms Order No. 7812135

An automatic system to locate plus-like images called reseaux on aerial photographs is presented. A minicomputer system and microdensitometer is used for accurate location of these images within a photograph. A model was generated from the statistics of actual reseaux samples to create a test vehicle for the performance of various picture processing algorithms. A method of including various photographic effects into the model is presented. Various combinations of scene analysis schemes are presented with results for the center location problem. Preprocessing techniques for noise removal are described. Also developed is a scheme for noise removal. Two methods of center location are described and comparative speed and accuracy results presented. The operation of the final system is also described. Dissert. Abstr.

N78-33503 Kansas Univ., Lawrence.
ECOSYSTEM MAPPING BY INTERPRETATION OF LANDSCAPES FROM SATELLITE IMAGERY Ph.D. Thesis
Donald Lee Williams 1977 221 p
Avail: Univ. Microfilms Order No. 77-28925

Images produced by LANDSAT-1 were interpreted for five test sites. These sites, located in Kansas, Tennessee, Uganda, Western Australia, and Papua, New Guinea, were selected to include a wide range of vegetation and landform types in areas where either direct observations or previously published landscape maps were available. Interpretation techniques employed were adapted from techniques used by human interpreters of conventional aerial photography. A four-point methodology for preparing landscape maps from satellite imagery is proposed. This methodology covers (1) criteria for selection of suitable imagery and procedure for collection of supporting data, (2) consideration of image interpretation techniques most appropriate to this type of mapping, (3) the field survey program, and (4) procedures in the preparation of a finished landscape map. Dissert. Abstr.

N78-33504 Dartmouth Coll., Hanover, N.H.
MAPPING ULTRAMAFIC ROCKS BY COMPUTER ANALYSIS OF DIGITAL LANDSAT DATA Ph.D. Thesis
Gerald George Carlson 1978 277 p
Avail: Univ. Microfilms Order No. 7816101

A new algorithm, PROBLYMAP, was developed to classify digital LANDSAT data for the purpose of mapping geology or terrain type. The algorithm assigns to each pixel a set of probabilities belonging to each terrain type. An important feature of this algorithm is that the classification of a pixel is influenced not only by its own probabilities but also by those of its eight adjacent neighbors. The main application of the algorithm was the mapping of the suite of ultramafic and mafic rocks and related sediments in the desert environment of the Oman Mountains, Sultanate of Oman. The resulting classification map shows good agreement with the best ground truth available, which includes a geology map at 1:500,000 and 1:60,000 black and white air photos. Using training sites from three known copper deposits, 180 other gossan zones were identified within the gabbro/basalt sequence. Dissert. Abstr.

N78-33505*# Pennsylvania State Univ., University Park. Office for Remote Sensing of Earth Resources.
A STUDY OF THE TYRONE-MOUNT UNION LINEAMENT BY REMOTE SENSING TECHNIQUES AND FIELD METHODS Final Report, 1 Jan. 1976 - 30 Jun. 1977
David P. Gold, Principal Investigator Dec. 1977 65 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 ERTS (Contract NAS5-22822)
(E78-10155; NASA-CR-156815) Avail: NTIS HC A04/MF A01 CSCL 08B

The author has identified the following significant results. This study has shown that subtle variations in fold axes, fold form, and stratigraphic thickness can be delineated. Many of the conclusions were based on extrapolation in similitude to different scales. A conceptual model was derived for the Tyrone-Mount Union lineament. In this model, the lineament was the morphological expression of a zone of fracture concentrations which penetrated basement rocks and may have acted as a curtain to regional stresses or as a domain boundary between uncoupled adjacent crustal blocks.

N78-33506*# General Electric Co., Philadelphia, Pa. Space Div.
PLACE: POST LANDSAT D ADVANCED CONCEPT EVALUATION Final Report
Larry Alexander, Principal Investigator 18 Aug. 1978 418 p refs ERTS
(Contract NAS2-9580)
(E78-10156; NASA-CR-156818; DOC-78SDS4238) Avail: NTIS HC A18/MF A01 CSCL 05B

There are no author-identified significant results in this report.

N78-33507*# Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
DEVELOPMENT OF HEAVILY VEGETATED AREA IN BRAZIL [PLANETAMENTO DO PROJETO CERRADO]

Nelson deJesusParada, Principal Investigator, Hideyo Aoki, Joao Roberto dosSantos, and Vitor Celso deCarvalho Jan. 1978 24 p In PORTUGUESE Sponsored by NASA ERTS
(E78-10157; NASA-CR-157268; INPE-1186-NTE/109) Avail: NTIS HC A02/MF A01 CSCL 08F

There are no author-identified significant results in this report.

N78-33508*# World Meteorological Organization, Geneva (Switzerland).
A PLAN FOR THE COLLECTION AND TRANSMISSION OF HYDROMETEOROLOGICAL DATA IN THE BRASILIAN AMAZON BASIN
Robert A. Halliday, Principal Investigator Apr. 1978 97 p refs Sponsored by NASA ERTS
(E78-10175; NASA-CR-157270; BRA372/010) Avail: NTIS HC A05/MF A01 CSCL 08F

There are no author-identified significant results in this report.

N78-33509*# National Physical Research Lab., Pretoria (South Africa). Optical Sciences Div.
A NIMBUS G PRE-LAUNCH FIELD EXPERIMENT IN THE GULF OF MEXICO, OCTOBER 1977
H. vanDerPiepen Nov. 1977 26 p Sponsored by NASA
(NASA-CR-157786; CSIR-FIS-162; ISBN-0-7988-1287-7) Avail: NTIS HC A03/MF A01 CSCL 04B

A large scale field experiment, which was arranged in support of the Nimbus G - Coastal Zone Color Scanner (CZCS) project was studied. The experiment was to provide three air and two shipborne platforms simultaneously to members of the Nimbus G Experiment Team (NET) and to other scientists in order to collect data from common test sites. Besides establishing fundamental relations between the light in the sea and the biochemical properties of water, the data will be used mainly for the development of algorithms during the prelaunch phase of Nimbus G. B.B.

N78-33510*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AERIAL THERMOGRAPHY FOR ENERGY CONSERVATION
John R. Jack Sep. 1978 22 p refs Original contains color illustrations
(NASA-TM-78959; E-9711) Avail: NTIS HC A02/MF A01 CSCL 14E

Thermal infrared scanning from an aircraft is a convenient and commercially available means for determining relative rates of energy loss from building roofs. The need to conserve energy as fuel costs makes the mass survey capability of aerial thermography an attractive adjunct to community energy awareness programs. Background information on principles of aerial thermography is presented. Thermal infrared scanning systems, flight and environmental requirements for data acquisition, preparation of thermographs for display, major users and suppliers of thermography, and suggested specifications for obtaining aerial scanning services were reviewed. B.B.

N78-33511*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RADAR TARGET REMOTELY SENSING HYDROLOGICAL PHENOMENA Patent Application
Wilford E. Sivertson, Jr., inventor (to NASA) Filed 22 Sep. 1978 18 p
(NASA-Case-LAR-12344-1; US-Patent-Appl-SN-945041) Avail: NTIS HC A02/MF A01 CSCL 08H

Apparatus for remotely measuring and accessing water status at selected locations on the surface of the earth is disclosed. A radar target whose radar cross-section varies as a function of the height of the water level within the target is described. The target consists essentially of a right circular cylinder with its central axis perpendicular to the ground level, a flat circular plate symmetrically attached to the lower end of the cylinder and parallel to the ground level surface, and a catch basin including said circular cylinder and said circular plate for catching and retaining water. The circular cylinder and the flat circular plate are made from a material (electrical conductor) that reflects radar signals such as aluminum, copper, and stainless steel. The brightness of the image taken by a radar from a satellite or an airplane decreases as the level of the water increases. The level of water in a radar target is indicative of the water status at the location of that particular radar target. NASA

N78-33512*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REMOTE SENSING OF ATMOSPHERIC WATER VAPOR, LIQUID WATER AND WIND SPEED AT THE OCEAN SURFACE BY PASSIVE MICROWAVE TECHNIQUES FROM THE NIMBUS-5 SATELLITE
A. T. C. Chang and T. T. Wilheit Jun. 1977 33 p refs
(NASA-TM-79568) Avail: NTIS HC A03/MF A01 CSCL 04A

The microwave brightness temperature measurements for Nimbus-5 electrically scanned microwave radiometer and Nimbus E microwave spectrometer are used to retrieve the atmospheric water vapor, liquid water and wind speed by a quasi-statistical retrieval technique. It is shown that the brightness temperature can be utilized to yield these parameters under various weather conditions. Observations at 19.35 GHz, 22.235 GHz and 31.4 GHz were input to the regression equations. The retrieved values of these parameters for portions of two Nimbus-5 orbits are presented. Then comparison between the retrieved parameters and the available observations on the total water vapor content and the surface wind speed are made. The estimated errors for retrieval are approximately 0.15 g/sq cm for water vapor content, 6.5 mg/sq cm for liquid water content and 6.6 m/sec for surface wind speed. Author

N78-33513*# Systems and Applied Sciences Corp., Riverdale, Md.
REMOTE SENSING OF RAIN OVER THE OCEAN Final Report
8 May 1978 36 p refs
(Contract NAS5-24198)
(NASA-CR-156843; R-SAG-5/78-01) Avail: NTIS HC A03/MF A01 CSCL 04B

Computer models of the microwave emission from the earth's atmosphere were used to study the problem of retrieving meteorological information from the SMMR instrument that will be flown on NIMBUS-G. Methods for retrieving rain rate, wind speed, cloud height, and ocean temperature are described for the case when the satellite is over the ocean. G.G.

N78-33514# Mitre Corp., Bedford, Mass.
GEOGRAPHIC DATA DISPLAY
D. E. Bell Jun. 1978 100 p refs
(Contract F19628-77-C-0001)
(AD-A056101; MTR-3315; ESD-TR-77-362) Avail: NTIS HC A05/MF A01 CSCL 14/5

This report addresses the problem of providing a geographic background for the overlay of real-time C3 information. A general design is presented which includes automatic control of detail, selection of display features and an overlay capability for event data (real-time data). A brief description of the current implementation of the design is included. Author (GRA)

N78-33515# R and D Associates, Marina Del Rey, Calif.
EVALUATION OF GEOTHERMAL ENERGY EXPLORATION AND RESOURCE ASSESSMENT, VOLUME 1: A REVIEW OF GEOTHERMAL SUBSIDENCE MODELING Final Report
M. K. Grover, J. G. Lewis, D. Oberste-Lehn, G. E. Rawson, and D. S. Srinivasa Dec. 1977 296 p refs
(Contract EY-76-C-03-1269)
(SAN-1269-1-Vol-1; RDA-TR-0400-001-Vol-1) Avail: NTIS HC A13/MF A01

Numerical modeling of subsidence phenomena associated with the production of fluid from geothermal reservoirs is evaluated. A comparative analysis of their potential for application to specific geologic environments where the subsidence may occur is presented. Guidelines for subsidence modeling application to assist program managers responsible for the supervision of subsidence monitoring and control measures associated with geothermal development are included. Data acquisition and management, a proposed method for qualitatively ranking the subsidence risks of a known geothermal reservoir, and data uncertainties management are reviewed. ERA

N78-33516# Westinghouse Electric Corp., Pittsburgh, Pa.
SENSOR APPLICATIONS STUDY. TECHNICAL REPORT, TASK 1
1978 57 p refs
(Contract EY-76-C-02-4082)
(TID-27941) Avail: NTIS HC A04/MF A01

Task 1 is a survey of well logging instrumentation undertaken to determine to what extent various tools can make use of severe environment acoustic sensor technology. The major goal was to establish the most appropriate tool for Task 2-Sensor Development and Optimization. Subject tools are borehole televiewer (BHTV), acoustic caliper, acoustic velocity logger, down hole flow meter (DHFM), and passive listening monitor. This report describes the investigation of tool capabilities, applications, operation, and limitations under present and anticipated geothermal conditions. Acoustic velocity logger and passive listening devices are viewed as playing an important but lower priority role in geothermal resource characterization and development. ERA

N78-33517# Du Pont de Nemours (E. I.) and Co., Aiken, S. C.
NURE GEOCHEMICAL INVESTIGATIONS IN THE EASTERN UNITED STATES
V. Price 1977 46 p refs Presented at the 7th Intern. Geochem. Exploration Symp., Golden, Colo., 6-20 Apr. 1978
(Contract EY-76-C-09-0001)
(DP-MS-77-101; Conf-780435-1) Avail: NTIS HC A03/MF A01

Stream samples were collected at a density of one per 13 square kilometers in crystalline rock areas and 25 square kilometers in sedimentary rock areas. Stream sediment was taken at each site, and stream water was concentrated on ion exchange resin in some areas. Ground water samples were collected at an average density of about one site per 20 square kilometers. Measurements made at each site included alkalinity, pH, and conductivity of water. Measurements of the radon and helium contents of ground water samples were made on a semiregional scale in pilot studies. Samples were analyzed by neutron activation techniques. Concentrations of uranium and about 20 other elements were determined in concentrated water samples. Results from several studies are discussed including a Triassic Basin area near Sanford, North Carolina; the North and South Carolina Coastal Plain; and from reconnaissance studies in the Carolinas-Virginia Piedmont and Blue Ridge areas. ERA

N78-33518# Department of Energy, Washington, D. C.
ENVIRONMENTAL DEVELOPMENT PLAN (EDP). ENHANCED GAS RECOVERY, FY 1977
Mar. 1978 104 p refs
(DOE/EDP-23) Avail: NTIS HC A06/MF A01

Environmental impacts of enhanced gas recovery processes in shale and sandstone, methane drainage from coalbeds, and methane recovery from geopressured aquifers are discussed. The EDP addresses planning in two basic areas: environmental research and environmental assessment. Environmental research can be categorized as follows: characterization of pollutants from EGR processes; selective application of monitoring and measuring techniques; evaluation of control/mitigation techniques; and evaluation of the synergistic impacts of the development of EGR techniques. Environmental assessment activities scheduled by EDP include: assessment of ecological impacts; assessment of socioeconomic effects; EIA/EIS preparation; evaluation of control technology needs; and analysis of applicable and proposed emission, effluent, and health and safety standards. ERA

N78-33519# Texas Instruments, Inc., Dallas.
MANUAL FOR THE APPLICATION OF NURE 1974-1977 AERIAL GAMMA-RAY SPECTROMETER DATA
D. F. Saunders and M. J. Potts Sep. 1977 184 p
(Contract EY-76-C-13-1664)
(GJBX-13-78) Avail: NTIS HC A09/MF A01

Instructions for the interpretation and application of high-sensitivity aerial gamma-ray spectrometer data in uranium exploration are presented. Particular emphasis is on the first 10 radiometric surveys performed under the National Uranium Resource Evaluation program to map regional distributions of near-surface natural radioelements. The fundamentals of uranium geology and geochemistry along with interpretive approaches which may be used to identify statistically and geochemically significant uranium anomalies and uraniferous provinces are outlined. Follow-up prospecting methods are summarized along with guides to recent literature. Specific suggestions are made as to interpretive approaches and applicable follow-up prospecting procedures tailored to fit the data characteristics and general environment of the aerial gamma-ray spectrometer surveys. ERA

N78-33520# General Accounting Office, Washington, D. C. Community and Economic Development Div.
BENEFITS DERIVED FROM THE OUTER CONTINENTAL SHELF ENVIRONMENTAL STUDIES PROGRAM ARE QUESTIONABLE
1 Jun. 1978 33 p refs
(PB-281782/3; CED-78-93) Avail: NTIS HC A03/MF A01 CSCL 08I

The Outer Continental Shelf environmental studies program is costly and may do little toward minimizing environmental damage during oil and gas exploration, development, and production in the Outer Continental Shelf. Uncertainties about program effectiveness are exemplified in the Alaska studies program. GAO believes that the Outer Continental Shelf environmental studies program needs to be reassessed for how it can best be used in the decision making process, what information is needed, and the type of plans that are necessary. This report includes recommendations to the Secretaries of the Interior and Commerce. GRA

N78-33521# General Accounting Office, Washington, D. C. Energy and Minerals Div.
LOWER COOK INLET: ANOTHER EXAMPLE OF MORE DATA NEEDED FOR APPRAISING OUTER CONTINENTAL SHELF OIL AND GAS RESOURCES Report to the Congress
8 Jun. 1978 56 p refs
(PB-281769/0; EMD-78-48) Avail: NTIS HC A04/MF A01 CSCL 08I

Improved methods for selecting and evaluating outer continental shelf lands for oil and natural gas exploration are discussed. One hundred thirty-five oil and gas tracts off the southern Alaskan coast, Lower Cook Inlet, were offered for lease to the highest industry bidders. Two types of bidding systems used were cash bonus bid with a fixed royalty and required bonus with a percentage royalty bid. The revenue received from the lease tracts was about 398.5 million. GRA

N78-33522# Federal-State Land Use Planning Commission for Alaska, Anchorage.
LAND USE PLANNING ISSUES AND THE ALASKA GAS PIPELINE: A REPORT TO THE PRESIDENT
Walter B. Parker, Jerry D. Kreitner, Dennis M. Dooley, and Kris Hoeltgen Aug. 1977 120 p refs
(PB-281327/7) Avail: NTIS HC A06/MF A01 CSCL 10A

Information needed for the selection of an appropriate route for transportation of Alaska North Slope gas is given. Broad social, economic, and environmental concerns are presented. Topics considered include the following: design and routing implications of the Alaskan gas pipeline proposals; suggested outline for policy development relating to long-term Alaska oil and gas development and transportation system; and a review of the status of Canadian native land claims. GRA

N78-33523# National Technical Information Service, Springfield, Va.
REMOTE SENSING APPLIED TO HYDROLOGY. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jul. 1978
Audrey S. Hundemann Aug. 1978 196 p Supersedes NTIS/PS-77/0677
(NTIS/PS-78/0792/8; NTIS/PS-77/0677) Avail: NTIS HC $28.00/MF $28.00 CSCL 08H

The use of aerial and satellite imagery in hydrologic studies, including water resources planning and management, is discussed. The abstracts cover remote sensing studies of water quality, soil moisture, floodplain delineation, ice cover, and determination of snow depth and water equivalent. (This updated bibliography contains 189 abstracts, 33 of which are new entries to the previous edition.) GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N78-33524 Pennsylvania State Univ., University Park.
HIGH-TEMPERATURE LINEAR RADIATION-CAVITY SOLAR COLLECTOR WITH A FRESNEL CONCENTRATOR Ph.D. Thesis
Zenen Igor Antoniak 1978 234 p
Avail: Univ. Microfilms Order No. 7812029

A model solar-thermal concentrator-collector that is 1/6th scale relative to a system considered to be of practical dimensions for power generation was constructed and tested. It consists of: a mirror-concentrator, a receiver pipe, a graphite absorber, and a gaseous heat transfer medium. The mirror-concentrator utilizes 40 suitably tilted reflective strips mounted in a parallel planar array which moves eastwest. The effect of various parameters such as insulation thickness, aperture width, and antireflective coatings were investigated in an optimization study of the proposed full-scale collector. Aperture width, aperture emittance, and mirror reflectance exert the strongest influence on exit temperature and collector efficiency. Dissert. Abstr.

N78-33525 Carnegie-Mellon Univ., Pittsburgh, Pa.
SIGNIFICANCE OF PROCESS VARIABLES ON LIQUID EFFLUENT PRODUCTION IN COAL GASIFICATION Ph.D. Thesis
David Vincent Nakles 1978 312 p
Avail: Univ. Microfilms Order No. 7814230

The production of liquid effluents, condensible hydrocarbons, and water soluble contaminants, was investigated. Significant variations in tar, phenol, chemical oxygen demand, and total organic carbon production occur during transient operating periods, i.e., start-up or shutdown, and between steady state operations at different gasifier operating conditions. In particular, changes in conditions which enhance the approach of effluent species to chemical equilibrium dramatically influence steady state liquid effluent production. Increasing gas-solid contacting, the final reaction temperature, and residence time of the devolatilized species in the hot zone of the reactor reduce organic liquid effluent production significantly. Near complete extinction of these compounds is possible by providing the appropriate combination of coal devolatilization conditions and product gas residence time. Dissert. Abstr.

N78-33526* National Aeronautics and Space Administration. Pasadena Office, Calif.
HYDROGEN-FUELED ENGINE Patent
Eugene A. Lauman (JPL) and Rollins K. Reynolds, inventors (to NASA) (JPL) Issued 12 Sep. 1978 6 p Filed 27 Aug. 1976 Supersedes N77-11398 (15 - 02, p 0200) Sponsored by NASA
(NASA-Case-NPO-13763-1; US-Patent-4,112,875; US-Patent-Appl-SN-718268; US-Patent-Class-123-DIG.12; US-Patent-Class-123-1A; US-Patent-Class-123-3) Avail: US Patent Office CSCL 10A

A hydrogen-oxygen fueled internal combustion engine is described, which utilizes an inert gas, such as argon, as a working fluid to increase the efficiency of the engine, eliminate pollution, and facilitate operation of a closed cycle energy system. In a system where sunlight or other intermittent energy source is available to separate hydrogen and oxygen from water, the oxygen and inert gas are taken into a diesel engine into which hydrogen is injected and ignited. The exhaust is cooled so that it contains only water and the inert gas. The inert gas in the exhaust is returned to the engine for use with fresh oxygen, while the water in the exhaust is returned to the intermittent energy source for reconversion to hydrogen and oxygen.
Official Gazette of the U.S. Patent Office

N78-33527*# Honeywell, Inc., Minneapolis, Minn.
DEVELOPMENT OF FLAT-PLATE SOLAR COLLECTORS FOR THE HEATING AND COOLING OF BUILDINGS: EXECUTIVE SUMMARY
[1978] 21 p
(Contract NAS3-17862)
(NASA-CR-134804) Avail: NTIS HC A02/MF A01 CSCL 10A

An efficient, low cost, flat-plate solar collector was developed. Computer aided mathematical models of the heat process in the collector were used in defining absorber panel configuration; determining insulation thickness; and in selecting the number, spacing, and material of the covers. Prototypes were built and performance tested. Data from simulated operation of the collector are compared with predicted loads from a number of locations to determine the degree of solar utilization. S.B.S.

N78-33528*# Owens-Illinois, Inc., Toledo, Ohio.
INSTALLATION PACKAGE FOR SUNPAK SOLAR COLLECTORS
Sep. 1978 13 p refs Prepared for DOE
(Contract NAS8-32259)
(NASA-CR-150802) Avail: NTIS HC A02/MF A01 CSCL 10A

A subsystem (air/liquid vacuum collector) was developed for use with solar combined heating and cooling subsystems. The collector is modular in design, is approximately twelve-feet-three-inches wide and is eight-feet-seven-inches high. The module contains 72 collector tube elements and weighs approximately 300 pounds. G.G.

N78-33529*# Northrup, Inc., Hutchins, Tex.
DEVELOPMENT AND FABRICATION OF A CONCENTRATING SOLAR COLLECTOR SUBSYSTEM Quarterly Reports, 1 Jan. 1978 - 30 Jun. 1978
Jul. 1978 67 p Prepared for DOE
(Contract NAS8-32251)
(NASA-CR-150787) Avail: NTIS HC A04/MF A01 CSCL 10A

Testing and evaluation results for the structural design of the concentrating solar collector and the attitude control system are reported. G.G.

N78-33530*# Houston Chemical Co., Corpus Christi, Tex.
SOLAR HEAT TRANSPORT FLUID Quarterly Report, May 1978 - Aug. 1978
Sep. 1978 11 p Prepared for DOE
(Contract NAS8-32255)
(NASA-CR-150806) Avail: NTIS HC A02/MF A01 CSCL 10A

The development and delivery of noncorrosive fluid subsystems are reported that are compatible with closed-loop solar heating or combined heating and hot water systems. They are also compatible with both metallic and non-metallic plumbing systems. The performance testing of a number of fluids is described. G.G.

N78-33531*# Solafern Ltd., Bourne, Mass.
DESIGN PACKAGE FOR A COMPLETE RESIDENTIAL SOLAR SPACE HEATING AND HOT WATER SYSTEM
Sep. 1978 68 p Prepared for DOE
(Contract NAS8-32246)
(NASA-CR-150795) Avail: NTIS HC A04/MF A01 CSCL 10A

Information necessary to evaluate the design of a solar space heating and hot water system is reported. System performance specifications, the design data brochure, the system description, and other information pertaining to the design are included. G.G.

N78-33532*# CALMAC Mfg. Co., Englewood, N. J.
CERTIFICATION AND VERIFICATION FOR CALMAC FLAT PLATE SOLAR COLLECTOR
Sep. 1978 159 p Prepared for DOE
(Contract NAS8-32253)
(NASA-CR-150784; Rept-77S1111) Avail: NTIS HC A08/MF A01 CSCL 10A

Information used in the certification and verification of the Calmac Flat Plate Collector is presented. Contained are such

items as test procedures and results, information on materials used, installation, operation, and maintenance manuals, and other information pertaining to the verification and certification. G.Y.

N78-33533*# Bechtel International Corp., San Francisco, Calif.
MODULE/ARRAY INTERFACE STUDY Final Report
Aug. 1978 128 p refs Sponsored by NASA Prepared for DOE and JPL
(Contract JPL-954698)
(NASA-CR-157774; DOE/JPL-954698-78/1) Avail: NTIS HC A07/MF A01 CSCL 10A

Several aspects of module design are evaluated, including glass superstrate and metal substrate module configurations, the potential for hail damage, light absorption in glass superstrates, the economics of glass selection, and electrical design. Also, three alternate glass superstrate module configurations are evaluated by means of finite element computer analyses. Two panel sizes, 1.2 by 2.4 m (4 by 8 ft) and 2.4 by 4.8 m are used to support three module sizes, 0.6 by 1.2 m, 1.2 by 1.2 m, and 1.2 by 2.4 m, for design loadings of + or - 1.7 kPa, + or - 2.4 kPa, and + or - 3.6 kPa. Designs and cost estimates are presented for twenty panel types and nine array configurations at each of the three design loadings. Structural cost sensitivities of combined array configurations and panel cases are presented. L.S.

N78-33534*# Bechtel Corp., San Francisco, Calif. Research and Engineering Operation.
TERRESTRIAL CENTRAL STATION ARRAY LIFE-CYCLE ANALYSIS SUPPORT STUDY Final Report
Aug. 1978 211 p refs Sponsored by NASA Prepared for JPL
(Contract JPL-954848)
(NASA-CR-157772; DOE/JPL-954848-78/1) Avail: NTIS HC A10/MF A01 CSCL 10B

Plant elements evaluated included designs for module, panel and array structures, as well as balance-of-plant systems. Installation and maintenance procedures and the impact of site environment were also evaluated. In terms of the cost of energy produced, the horizontal array configuration was found to be less expensive than the tandem array at latitudes less than 40 deg. Both of these configurations are less expensive than the rack design. However, the costs of energy for all three configurations are within approximately ±10 percent of each other. For flat plate panels, the seasonally adjusted and tracking array configurations are not economically attractive when compared to the three other designs. Balance-of-plant costs are approximately equal to (goal) module costs. The array structures and foundations are the most expensive items in the balance-of-plant costs. L.S.

N78-33535*# Battelle Columbus Labs., Ohio.
EVALUATION AVAILABLE ENCAPSULATION MATERIALS FOR LOW-COST LONG-LIFE SILICON PHOTOVOLTAIC ARRAYS Final Report
D. C. Carmichael, G. B. Gaines, G. T. Noel, F. A. Sliemers, G. P. Nance, A. R. Bunk, and M. C. Brockway 30 Jun. 1978 110 p refs Prepared for DOE and JPL
(Contract JPL-954328)
(NASA-CR-157758; DOE/JPL-954328-78/2) Avail: NTIS HC A06/MF A01 CSCL 10A

Experimental evaluation of selected encapsulation designs and materials based on an earlier study which have potential for use in low cost, long-life photovoltaic arrays are reported. The performance of candidate materials and encapsulated cells were evaluated principally for three types of encapsulation designs based on their potentially low materials and processing costs: (1) polymeric coatings, transparent conformal coatings over the cell with a structural-support substrate; (2) polymeric film lamination, cells laminated between two films or sheets of polymeric materials; and (3) glass-covered systems, cells adhesively bonded to a glass cover (superstrate) with a polymeric pottant and a glass or other substrate material. Several other design types, including those utilizing polymer sheet and pottant materials, were also included in the investigation. Author

N78-33536*# Xerox Electro-Optical Systems, Pasadena, Calif.
CENTER PUNCHED SOLAR CELL MODULE DEVELOPMENT EFFORT Final Report
R. E. Ross and W. E. Mortensen Jun. 1978 32 p Prepared for DOE and JPL
(Contract JPL-954693)
(NASA-CR-157760; DOE/JPL-954693-78/1) Avail: NTIS HC A03/MF A01 CSCL 10A

The results are given of an advanced module development program with the objective of providing a low cost solar cell mechanical interconnect design. The design approach, which avoids soldering or welding operations, lends itself to automated assembly techniques thus supporting the Low-Cost Silicon Solar Array Project goals. The first group of six modules contained aluminum contact cells and the second group of six modules contained silver-titanium-palladium contact cells. Extensive component and environmental testing at the module level showed that reliable cell mechanical interconnection can be achieved when utilizing the proper electrical contact materials and pressures. A discussion is given of the module design, manufacturing procedure, test program, significant problem areas and solutions, and conclusions and recommendations as formulated and conducted by XEOS. L.S.

N78-33537*# Martin Marietta Aerospace, Denver, Colo.
APPLICATIONS OF THERMAL ENERGY STORAGE IN THE CEMENT INDUSTRY Final Report, Sep. 1977 - Mar. 1978
F. A. Jaeger, D. G. Beshore, F. M. Miller, and E. M. Gartner Oct. 1978 205 p refs Sponsored by NASA Prepared in cooperation with Portland Cement Assoc.
(Contracts EC-77-C-01-5084; EC-77-A-31-1034)
(NASA-CR-159399; CONS/5084-1) Avail: NTIS HC A10/MF A01 CSCL 10C

In the manufacture of cement, literally trillions of Btu's are rejected to the environment each year. The purpose of this feasibility study program was to determine whether thermal energy storage could be used to conserve or allow alternative uses of this rejected energy. This study identifies and quantifies the sources of rejected energy in the cement manufacturing process, established use of this energy, investigates various storage system concepts, and selects energy conservation systems for further study. Thermal performance and economic analyses are performed on candidate storage systems for four typical cement plants representing various methods of manufacturing cement. Through the use of thermal energy storage in conjunction with waste heat electric power generation units, an estimated 2.4 x 10 to the 13th power Btu/year, or an equivalent on investment of the proposed systems are an incentive for further development. Author

N78-33538*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NUCLEAR ELECTRIC POWER SOURCES
Jag J. Singh Sep. 1978 23 p refs
(NASA-TM-78789) Avail: NTIS HC A02/MF A01 CSCL 10C

Measurements on radioactive commercial p-n junction silicon cells show that these units are capable of delivering several hundred microwatts per curie of Am-241 alpha source, indicating their usefulness in such electronic devices as hearing aids, heart pacemakers, electronic watches, delay timers and nuclear dosimeter chargers. It is concluded that the Am-241 sources are superior to the beta sources used previously, because of higher alpha specific ionization and simultaneous production of low energy photons which are easily converted into photoelectrons for additional power. Author

N78-33539*# Naval Weapons Support Center, Crane, Ind
CYCLE LIFE TEST Progress Report
J. D. Harkness 10 Mar. 1977 215 p refs
(NASA Order S-53742-AG)
(NASA-CR-156846; AR-13; WQEC/C-77-87) Avail: NTIS HC A10/MF A01 CSCL 10C

Statistical information concerning cell performance characteristics and limitations of secondary spacecraft cells is presented. Weaknesses in cell design as well as battery weaknesses encountered in various satellite programs are reported. Emphasis is placed on improving the reliability of space batteries. J.M.S.

N78-33540# Energy Research Corp., Danbury, Conn.
REVERSIBLE METAL HYBRIDE-AIR FUEL CELL Final Report, Feb. 1977 - Feb. 1978
Michael George and Joseph Scozzafava Jun. 1978 38 p refs
(Contract DAAB07-77-C-2644; DA Proj. 1G7-63702-DG-10)
(AD-A056591; ECOM-77-2644-F) Avail: NTIS HC A03/MF A01 CSCL 10/2

A 60 watt portable power fuel cell system has been built operating on ambient air and hydrogen as supplied by the deactivation of lanthanum nickel hydride. The use of the endothermic hydride deactivation process in conjunction with the fuel cell considerably reduced steady state system operating temperatures. The hydride reaction was initially sustained through use of heating coil, but thereafter could be maintained at 20 C by transferring waste heat from the fuel cell. Author (GRA)

N78-33541# Energy Research Corp., Danbury, Conn.
A 1.5 kW METHANOL FUEL CELL POWERPLANT Final Report
S. G. Abens, M. Lambrech, P. Marchetti, I. Michalko, and D. Patel Apr. 1978 155 p refs
(Contract DAAG53-76-C-0118; DA Proj. 1L7-63702-DG-10)
(AD-A057145) Avail: NTIS HC A08/MF A01 CSCL 10/2

A 1.5 kW indirect methanol fuel cell powerplant was constructed and tested. A methanol steam reformer was used in conjunction with a phosphoric acid fuel cell stack. Output voltage was adjustable between 26 and 34 volts, and automatic unattended operation was provided by a controller. Fuel consumption was 2.1 lb MeOH/Kwhr at rated power and 1.1 lbs MeOH/hr during standby. The powerplant was delivered to USA MERADCOM. 2 water recovery study for the powerplant was conducted. Author (GRA)

N78-33542# Burns and Roe, Inc., Woodbury, N. Y.
USAF TERRESTRIAL ENERGY STUDY. VOLUME 3, PART 2: ENERGY CONSERVATION SYSTEMS HANDBOOK Final Report, 1 Apr. 1976 - 1 Feb. 1978
A. Carlson, D. Fuller, R. Reyer, C. Mallner, and S. Fogelson May 1978 483 p refs
(Contract F33615-76-C-2171)
(AD-A057252; AFAPL-TR-78-19-Vol-3-Pt-2) Avail: NTIS HC A21/MF A01 CSCL 10/2

This report was prepared by Burns and Roe, Inc. to serve as a guide for the U.S. Air Force in selecting types of energy conversion systems to meet their future ground power requirements. The electric power requirements included in this report range from 10 kilowatts to 50 megawatts. Twenty-one types of systems, conventional as well as advanced, are considered. These include 19 types of energy conversion systems which utilize either chemical fuel, nuclear fuel, solar energy or wind energy and two types of energy storage systems which utilize electric power for recharging. Each system is characterized in terms of a set of economic, physical and performance parameters including acquisition costs, life cycle costs, size, efficiency and environmental constraints. A total of eighteen such parameters are presented for each type of system for several sets of requirements. The requirements are defined in terms of electric power level, frequency and duration of operation corresponding to typical U.S. Air Force ground applications. Author (GRA)

N78-33543# Mallory (P. R.) and Co., Inc., Burlington, Mass. Lab. for Physical Science.
SEALED PRIMARY LITHIUM-INORGANIC ELECTROLYTE CELL Final Report, 1 Mar. 1974 - 31 Jul. 1977 and 1 Oct. 1977 - 31 Mar. 1978
A. N. Dey Jul. 1978 253 p refs
(Contract DAAB07-74-C-0109)
(AD-A056370; DELET-TR-74-0109-F) Avail: NTIS HC A12/MF A01 CSCL 10/3

This report summarizes the R and D activities carried out by P.R. Mallory and Co. on the development of a primary Li/SOCl2 D cell from March 1974 to July 1977 and October 1977 to March 1978. The original objective of this program was to develop a D cell which is storable and operable in the temperature range of -40 to 160 F and is capable of delivering in excess of 150 WHr/lb at the thirty hour rate and peak power density of 50 watts/lb and a capacity degradation of less than 10% after one month of storage at 160 F. GRA

N78-33544# Naval Surface Weapons Center, White Oak, Md.
LITHIUM-BORON ALLOY ANODES FOR MOLTEN SALT BATTERIES (2) Progress Report
S. Dallek, D. W. Ernst, and B. F. Larrick 15 May 1978 35 p refs
(AD-A057258; NSWC/WOL/TR-78-63) Avail: NTIS HC A03/MF A01 CSCL 10/3

The lithium-boron alloy system has been studied using differential scanning calorimetry (DSC), metallography, and X-ray analysis. The alloy is a two-phase material, consisting of a high-melting crystalline compound with a stoichiometry of Li7B6 into which has been wicker excess elemental lithium. The excess lithium, while being held immobile by the solid Li7B6 matrix, is available for anodic anodic discharge in molten salt batteries. Author (GRA)

N78-33545# Battelle Pacific Northwest Labs., Richland, Wash.
COMPRESSED AIR ENERGY STORAGE ADVANCED SYSTEMS ANALYSIS Progress Report, FY 1977
D. K. Kreid and M. A. McKinnon Mar. 1978 133 p refs
(Contract EY-76-C-06-1830)
(PNL-2464) Avail: NTIS HC A07/MF A01

Technologies that will reduce the consumption of natural gas and oil are reviewed. Major areas of interest for the compressed air energy storage (CAES) program are: cost assessment for thermal energy storage (TES) systems that are suitable for CAES applications; potential fuel savings of hybrid CAES cycles that incorporate TES for recovery of the heat of compression and estimate the economic incentive for using TES in CAES systems; and modified CAES cycles that eliminate the use of gas and oil by the use of alternative fuels. ERA

N78-33546# Battelle Pacific Northwest Labs., Richland, Wash.
ECONOMIC FEASIBILITY OF STRONTIUM-90 FUELED HEATERS FOR USE IN COLD REGIONS
W. E. Sande and R. L. Aaberg Feb. 1978 54 p refs
(Contract EY-76-C-06-1830)
(PNL-2476) Avail: NTIS HC A04/MF A01

Cost estimates for various radioisotope fueled heating systems are given. The economic feasibility of radioisotope fueled heaters was determined by comparing them to fuel oil systems. The basic conceptual heat design considered were a heat source and radiation shielding with no external heat transfer equipment. Radioisotope heaters were much more expensive than fuel oil systems. The radioisotope fuel costs contribute 50 percent or more to the overall cost. An effective method to make a substantial reduction in radioisotope system cost would be to lower the Sr price from 10 cents/curie. Radioisotope heaters will not be economically competitive with fuel oil systems unless the price of strontium-90 is reduced below 10 cents/curie, fuel oil prices increase significantly; or for a particular application, the reliability or adaptability of a fuel oil system is unacceptable and a radioisotope system is satisfactory. ERA

N78-33547# Criterion Analysis, Inc., Dallas, Tex.
APPRAISAL OF ENERGY ANALYSIS Final Report
F. J. Alessio, B. L. Jackson, and D. B. Cohen Mar. 1978 109 p refs
(EPRI-EA-504) Avail: NTIS HC A06/MF A01

The methods and applications of energy analysis are reviewed and evaluated. Energy analysis is viewed in the broadest possible context, with a broad range of conclusions reached. Energy analysis is a useful complement to economic analysis in technological assessments and public policy decision making. ERA

N78-33548# Department of Energy, Washington, D. C. Office of Business Assistance Programs.
VOLUNTARY BUSINESS ENERGY CONSERVATION PROGRAM Progress Report
Apr. 1978 161 p
(DOE/CS-0018/6; PR-6) Avail: NTIS HC A08/MF A01

Data are compiled from 48 industry and trade associations representing 3,000 firms. Progress in energy conservation in the Voluntary Business Energy Conservation Program is reported. In the first six months of 1977, the Program's index of business energy efficiency was running at an estimated 9.2 percent above the 1972 base level. This increase is mostly attributable to sizable gains for the chemicals and petroleum industries, although energy

use improvements were generally widespread. However, moderate declines were recorded in the indexes for primary metals, foods, and textile industries. ERA

N78-33549# Federal Energy Administration, Washington, D. C. Office of Energy Conservation and Environment.
FEDERAL-ASSISTANCE PROGRAMS AND ENERGY-DEVELOPMENT-IMPACTED MUNICIPALITIES
Feb. 1976 107 p refs Sponsored by DOE
(FEA/D-77/039) Avail: NTIS HC A06/MF A01

A Federal-assistance program that does or could provide aid for very small communities impacted by major energy developments is reviewed. The discovery of oil, coal, or other energy sources in sparsely populated Western U.S. areas would create boom towns that would need the rapid development of facilities and manpower to provide public safety, public utilities, education, transportation, and health care. The federal assistance programs in the areas are described and methods for expediting and delivering such aid are discussed. ERA

N78-33550# Institute for Energy Analysis, Oak Ridge, Tenn.
LIMITS TO ENERGY CONSERVATION IN CHEMICAL PROCESSES
W. Gool Apr. 1978 30 p refs
(Contract EY-76-C-05-00333)
(ORAU/IEA-78-6(M)) Avail: NTIS HC A03/MF A01

A national policy for energy conservation is handicapped by two shortcomings. First, the objectives of energy conservation are poorly defined in many national policies. Second, no accepted yardstick is available by which to determine the priorities for different conservation projects. A general approach to establish a common conservation measure is described in this paper. Use of the thermodynamic limit to evaluate the conservation potential is shown to be inappropriate. For each production rate a real energy minimum exists, and it does not correspond to the thermodynamic limit. A simplified model is applied to an average kind of energy-intensive chemical production. The characteristics of the cost minimum and the energy minimum are used to derive a value in dollars per megajoule of energy saved, and the importance of this value for ranking priorities in a national energy policy is explained. ERA

N78-33551# Resource Planning Associates, Inc., Cambridge, Mass.
POTENTIAL FOR COGENERATION DEVELOPMENT IN SIX MAJOR INDUSTRIES BY 1985
Dec. 1977 217 p refs Sponsored by DoE
(HCP/M60172-01/2) Avail: NTIS HC A10/MF A01

Industrial cogeneration development potential both without and with government action was estimated for six industries that consume a significant amount of electricity and process heat: chemicals, petroleum refining, pulp and paper, steel food processing, and textiles. Process-steam topping applications were studied because the initial analysis of industrial cogeneration potential indicated that 60 to 70 percent of the potential development is in these applications. The 1985 thermal energy requirements for process use in industry were projected at 17,900 trillion Btu--13,900 trillion Btu for process steam and 4,000 trillion Btu for direct process heat. The 1985 waste heat bottoming cogeneration potential in the six focus industries was estimated to be 3,540 trillion Btu, predominantly (2,760 trillion Btu) in the chemical, steel, and refining industries. A maximum technical potential for cogeneration of 380 to 740 billion kWh of electric energy produced was used to estimate an energy savings of 1.0 to 1.6 million bbl/day oil equivalent. ERA

N78-33552# Department of Energy, Laramie, Wyo. Energy Research Center.
THERMAL CONVERSION OF OIL-SHALE KEROGEN USING CO AND WATER AT ELEVATED PRESSURES
J. J. Cummings and W. E. Robinson 1978 21 p refs
(LERC-78/1) Avail: NTIS HC A02/MF A01

Temperature, heating time, pressure, presence or absence of mineral carbonates, shale particle size, shale grade, presence of organic solvents and amount of water were investigated as variables affecting kerogen conversion. Higher conversions of kerogen at low temperatures were obtained by using the CO-H2O reaction anc CO-H2O-solvent reaction than by dry thermal processes. The soluble degradation products from the kerogen have elemental compositions similar to shale oils and would be suitable materials for hydrocracking and refining feedstocks. Other advantages are good conversion of extremely rich oil shales and good conversion of finely ground oil shale. Water-soluble minerals are removed from the shale residue during the reaction and are recovered as a valuable byproduct with significant environmental advantage. ERA

N78-33553# Burt, Hill, Kosar, Rittleman, and Associates, Butler, Pa.
MINIMUM ENERGY DWELLING (MED) WORKBOOK: AN INVESTIGATION OF TECHNIQUES AND MATERIALS FOR ENERGY CONSCIOUS DESIGN
Dec. 1977 430 p
(Contract EY-76-C-03-1198)
(SAN-1198-1) Avail: NTIS HC A10/MF A01

A workbook is presented based upon information gathered during the design phase of the Minimum Energy Dwelling. The objective of the project is to substantially reduce energy use by the incorporation of energy conservation and solar techniques in a single-family detached dwelling. The Project demonstrates to builders, as well as to the general public, a number of technological innovations that can, at reasonable cost, be included in a dwelling design. ERA

N78-33554# Department of Energy, Washington, D. C.
ENVIRONMENTAL DEVELOPMENT PLAN FOR ELECTRIC ENERGY SYSTEMS PROGRAM, 1977
G. Hagey and L. T. Krezanosky Mar. 1978 103 p
(DOE/EDP-0016) Avail: NTIS HC A06/MF A01

A framework is provided for: incorporating environmental considerations into the planning process at the earliest stage; resolving environmental concerns concurrently with the technology development; and ensuring that adverse environmental effects are mitigated through sound technological design. This Environmental Development Plan addresses the Electric Energy System Program which includes the following technologies: overhead ac/dc transmission; underground transmission (including superconducting transmission); generation; storage applications; systems development and forecasting studies; and systems control studies. ERA

N78-33555# Department of Energy, Washington, D. C.
ENVIRONMENTAL DEVELOPMENT PLAN FOR CONSERVATION RESEARCH AND TECHNOLOGY PROGRAM, 1977
D. Moses and M. Shapiro Mar. 1978 77 p refs
(DOE/EDP-0017) Avail: NTIS HC A05/MF A01

The Conservation Research and Technology (CONRT) EDP covers the environmental concerns related to CONRT technology R and D, whereas the end-use division EDPs cover the environmental concerns of system demonstrations and applications. Environmental strategy needs, objectives of this program, and technique for screening applicable projects are covered. Middle-grade heat utilization, alternative fuels, 4.8-MW(e) fuel-cell power plant development, and first-generation systems development are characterized. Scientific disciplines that were investigated to point out environmental concerns are: organic Rankine bottoming cycle, biphase system, resource assessment, wood-fired and waste-fired boilers, and fuel cells. The strategy for resolving environmental concerns is discussed. ERA

N78-33556# Department of Energy, Washington, D. C.
ENVIRONMENTAL DEVELOPMENT PLAN FOR THE DIVISION OF TRANSPORTATION ENERGY CONSERVATION, 1977
D. Maxfield and D. Moses Mar. 1978 172 p refs
(DOE/EDP-0018) Avail: NTIS HC A08/MF A01

The ecosystem, resource, physical environment, health safety, and socio-economic issues associated with the research, development, demonstration and assessment of thirteen transportation technologies are identified. These include the Stirling and gas turbine engines, constant speed accessory drive system, bottoming cycle for heavy duty trucks, continuously variable transmission, new hydrocarbons (brood-cut petroleum fuels), alcohol and synthetic fuels, hydrogen, electric and hybrid vehicles, pipeline bottoming cycle, and stratified-charge concept. A research and assessment strategy for resolving any potentially adverse

environmental issues stemming from these technologies is presented. The process provides a framework for: incorporating environmental consideration into agency planning processes at the earliest stages; resolving environmental issues concurrently with energy technology development; and assuring that adverse environmental effects are mitigated through sound technological design and are at the same level of importance as technological, fiscal, and institutional issues in decision-making. ERA

N78-33557# Department of Energy, Washington, D. C.
SIMPLE ECONOMIC MODEL FOR ENERGY RESEARCH AND SUPPLY STRATEGIES, DRAFT
G. H. Canavan and V. H. Reis Apr. 1978 76 p refs
(DOE/ER-0005/D) Avail: NTIS HC A05/MF A01

A simple transparent model of energy economics. The model can be used to determine energy prices and flows under a resonable range of resource and policy constraints. The model is based on familiar concepts of the equilibration of demand and supply to determine prices and flows. Demand structures are based on more sophisticated models. Supply structures are a combination of a simple physical model for the motion of supply curves of depletable resources, exogenous prescription of supplies from those sources for which environmental or social pressure subordinate economics to policy, and highly aggregated models for the penetration of new alternative energy systems as a function of their price, date of availability, and maximum growth rate. The model is calibrated by comparison with a more fundamental model which operates at roughly the same level of source aggregation. ERA

N78-33558# Los Alamos Scientific Lab., N. Mex.
PRELIMINARY OPTIMIZATION MODEL FOR ASSESSMENT OF ENERGY DEVELOPMENT IN THE ROCKY MOUNTAIN REGION
G. Hinman, C. Kolstad, G. Morris, R. Palmer, and R. Pendley Mar. 1978 61 p
(Contract W-7405-eng-36)
(LA-6689-MS) Avail: NTIS HC A04/MF A01

A linear programming model was developed to determine the most economically efficient way (subject to environment and other constraints) in which extraction, conversion, and transportation of energy forms can take place to satisfy demands. A description of the model includes: preliminary specification in some detail, a discussion of input data and some characteristic outputs, drawbacks in the preliminary version, and model refinements. ERA

N78-33559# Los Alamos Scientific Lab., N. Mex.
CONTRIBUTION OF CHEMISTRY TO ENERGY
Kenneth E. Cox 1978 23 p refs Presented at Div. of Fuel Chem. Meeting, Anaheim, Calif., 12-17 Mar. 1978
(Contract W-7405-eng-36)
(LA-UR-78-706; Conf-780305-15) Avail: NTIS HC A02/MF A01

Several examples of chemical research being done to solve the problems of energy supply both for near-term and long-term are described. Energy conversion and storage is discussed with emphasis on the conversion of water to hydrogen as an energy supply medium to satisfy societal demand. B.B.

N78-33560# AiResearch Mfg. Co., Torrance, Calif.
STUDY OF HEAT ENGINE/FLYWHEEL: HYBRID PROPULSION CONFIGURATION WITH ELECTRICAL TRANSMISSION SYSTEM, PHASE 1 Final Report
Apr. 1978 151 p refs
(Contract EY-76-C-04-0789)
(ALO-41/1) Avail: NTIS HC A08/MF A01

Mechanical and electronic options for the system were evaluated in a five passenger family sedan and were ranked according to cost, weight, and fuel economy. The primary use of this transmission system is to augment the heat engine with energy from the flywheel in such a manner as to level engine loads and improve the overall vehicle efficiency. The benefits of using this system are as follows: (1) provides fuel economy, which is unobtainable with conventional propulsion arrangements; (2) acceleration and passing performance same as provided by large V-8 engine; (3) meets 1985 Federal emission standards; (4) reduces direct operating cost for the consumer; and (5) reduces heat engine size. The hybrid's fuel consumption if 39.5 mpg, compared to 15 mpg projected for a conventional vehicle. This represents a 263% improvement in fuel economy. The hybrid also provides a 40% savings in direct operating cost. ERA

N78-33561# Sandia Labs., Albuquerque, N. Mex.
SOLAR TOTAL-ENERGY LARGE-SCALE EXPERIMENT AT SHENANDOAH, GEORGIA
R. W. Hunke 1978 14 p refs Presented at Symp. on Solar-Thermal Power Stations, Cologne, West Germany, 12 Apr. 1978
(Contract EY-76-C-04-0789)
(SAND-77-2075C; Conf-780425-1) Avail: NTIS HC A02/MF A01

The background, goals, objectives, and status of the solar total-energy system are outlined. The system is designed to make maximum use of collected solar energy by supplying both the low-grade (low-temperature thermal) and high-grade (electrical and/or mechanical) energy needs of selected applications. ERA

N78-33562# WESTEC Services, Inc., San Diego, Calif.
ENGINEERING AND ECONOMIC FEASIBILITY OF UTILIZING GEOTHERMAL HEAT FROM THE HEBER RESERVOIR FOR INDUSTRIAL PROCESSING PURPOSES AT VALLEY NITROGEN PRODUCERS INC., EL CENTRO AGRICULTURAL CHEMICAL PLANT Final Report
P. B. Sherwood and K. L. Newman Sep. 1977 200 p refs
(Contract EY-76-C-03-1323)
(SAN-1323-3) Avail: NTIS HC A09/MF A01

The analysis proceeds through the preliminary economics to determine the restraints imposed by geothermal modification size on internal rates of return, and through the energy utilization evaluation to determine the best method for substituting geothermal energy for existing fossil fuel energy. Finally, several geothermal utilization schemes were analyzed for detailed cost-benefit evaluation. An economically viable plan for implementing geothermal energy in the VNP Plant was identified and the final conclusions and recommendations were made based on these detailed cost-benefit analyses. Cost associated with geothermal energy production and implementation were formulated. ERA

N78-33563# Department of Energy, Washington, D. C.
DEMONSTRATION PROJECT AS A PROCEDURE FOR ACCELERATING THE APPLICATION OF NEW TECHNOLOGY. CHARPIE TASK FORCE REPORT, VOLUME 1
Feb. 1978 48 p 2 Vol.
(Contract EX-76-C-01-2295-006)
(DOE/RA-0003/1-Vol-1) Avail: NTIS HC A03/MF A01

Following the establishment on January 19, 1975, of the Energy Research and Development Administration, the Task Force on Demonstration Projects was organized to assist the new agency in evaluating its planning and management of its projects. The agency was to support research and development in energy-related areas, to be applied to the civil sector. The agency was also authorized to support the commercialization of new energy technology. The Task Force concluded it could not adequately provide guidance or demonstrations without examining ERDA's general commercialization role as defined in the statute. The Task Force decided to concentrate on these general aspects of the subject. The Task Force's general conclusions and recommendations on ERDA's overall commercialization role are given along with its specific consideration of the demonstration project and the demonstration project guidelines. ERA

N78-33564# Department of Energy, Washington, D. C.
DEMONSTRATION PROJECT AS A PROCEDURE FOR ACCELERATING THE APPLICATION OF NEW TECHNOLOGY. CHARPIE TASK FORCE REPORT, VOLUME 2
Feb. 1978 461 p 2 Vol.
(Contract EX-76-C-01-2295-006)
(DOE/RA-0003/2-Vol-2) Avail: NTIS HC A20/MF A01

The issues associated with government programs proposed for the commercialization of new energy technologies are examined. These include: (1) the role of research and development within the structure of the national energy goals and policies; (2) the process of technological change as it occurs with respect to energy technologies in terms of sources of misalignment of

social and private incentives; (3) correction of the sources of misalignment as the goal of commercial demonstration programs; and (4) circumstances under which government supported commercialization is likely to affect the success of subsequent stages of technological change. Methods for evaluation and planning of commercial demonstration programs are analyzed.

N78-33565# Battelle Pacific Northwest Labs., Richland, Wash.
ANALYSIS OF FEDERAL INCENTIVES USED TO STIMULATE ENERGY PRODUCTION: AN EXECUTIVE SUMMARY
B. W. Cone, D. L. Brenchley, V. L. Brix, M. L. Brown, K. E. Cochran, R. J. Cole, M. G. Curry, R. Davidson, J. Easterling, and A. G. Fassbender Mar. 1978 15 p
(Contract EY-76-C-06-1830)
(PNL-2410) Avail: NTIS HC A02/MF A01

An analysis was made of past and present Federal incentives to production of various energy sources and therby assist the Division of Solar Energy, Energy Research and Development Administration, in the study and recommendation of Federal incentives for the development of solar energy. The research was divided into five parts: a survey of current thought about incentives for solar energy production; the theoretical approach to analyzing and characterizing incentives; a generic view of the energy incentive-creating landscape for 1976; analysis of the major energy sources along their trajectories from exploration to waste management, including their costs in 1976 dollars; and insights into potential incentives for solar policy. Economic, political, organizational, and legal viewpoints were considered in formulating the typology of incentives. ERA

N78-33566# Aerotherm Acurex Corp., Mountain View, Calif.
SOLAR TOTAL ENERGY SYSTEM: LARGE SCALE EXPERIMENT. PHASE 2: CONCEPTUAL DESIGN Final Technical Progress Report
C. D. Hartman Sep. 1977 275 p
(Contract EG-77-C-04-3986; Proj. 7354)
(SE-3986-1) Avail: NTIS HC A12/MF A01

A conceptual design of a solar total energy system for a Knitwear factory in Shenandoah, Georgia was completed. A key design objective was to maximize the cost effectiveness of collected solar energy while using it to supply at least 60 percent of the total annual energy requirements of the plant. The design features a distributed solar energy receiver system with sun-tracking parabolic trough collectors oriented north-south, two toluene Rankine cycle turbogenerators, absorption cycle and vapor compression cycle water chillers, and high temperature oil/rock bed storage reservoirs. One turbogenerator at a minimum meets the solar energy system's own demand for electricity with heat rejected for this turbine used to generate steam for the factory. When additional solar energy is available, the additional electricity and heat from this turbine drives the vapor compression and absorption chillers to produce cold water for the plant's air-conditioning system. The second turbogenerator is designed to convert solar energy to electricity for the plant at maximum efficiency. ERA

N78-33567# Idaho National Engineering Lab., Idaho Falls.
RESIDENTIAL SPACE HEATING COST: GEOTHERMAL VS CONVENTIONAL SYSTEMS
I. A. Engen Feb. 1978 49 p refs
(Contract EY-76-C-07-1570)
(TREE-1182) Avail: NTIS HC A03/MF A01

Operating characteristics and economics of several representative space heating systems are analyzed. Analyses are based on the use of geothermal water at temperatures as low as 120 F in forced air systems and 140 F in baseboard convection and radiant floor panel systems. The baseboard convection system is the most economical type of geothermal space heating system when geothermal water of at least 140 F is available. Heat pumps utilizing water near 70 F, with negligible water costs, are economically feasible and they are particularly attractive when space cooling is included in system designs. Procurement and installation costs for similar geothermal and conventional space heating systems are about equal, so geothermal space heating is cost competitive when the unit cost of geothermal energy is less than or equal to the unit cost of conventional energy. Guides are provided for estimating the unit cost of geothermal energy for cases where a geothermal resource is known to exist. ERA

N78-33568# Department of Energy, Washington, D. C.
ENVIRONMENTAL DEVELOPMENT PLAN (EDP): SOLAR AGRICULTURAL AND INDUSTRIAL PROCESS HEAT, 1977
Mar. 1978 47 p refs
(DOE/EDP-0002) Avail: NTIS HC A03/MF A01

Potential environmental health safety, and socioeconomic impacts relevant to solar process heat are described. A management plan is presented for conducting and coordinating environmental research in concert with the technology development effort. Investigations include fluid/waste characterization studies, contamination pathway analyses, ecological effects research, human toxicology studies, and mitigation strategies. ERA

N78-33569# Resource Planning Associates, Inc., Washington, D. C.
INSTITUTIONAL APPLICATIONS OF SOLAR TOTAL ENERGY SYSTEMS Quarterly Report
31 Jan. 1978 75 p refs
(Contract EG-77-C-04-3768)
(ALO-3786-2; QR-3) Avail: NTIS HC A04/MF A01

Estimates are presented of the availability of land for solar total energy (STE) systems. The investigation of the external decision processes that affect an STE system choice was continued. The STE system/utility interface was examined, presenting regional time-of-day pricing scenarios and estimates of backup rates. The possible effects that the financial community could have on STE market penetration was considered. Regional and sectoral energy use profiles were developed. These profiles served as a basis for simulating yearly system performance on an hourly basis to estimate system costs and savings. Preliminary conceptual designs were developed for both thermal and photovoltaic STE systems. Refined system designs and detailed capital cost and performance estimates for the optimized designs are presented. Author (ERA)

N78-33570# Oak Ridge National Lab., Tenn. Energy Div.
COMMERCIAL DEMAND FOR ENERGY: A DISAGGREGATED APPROACH
Jerry R. Jackson, Steve Cohn, Jane Cope, and William S. Johnson Apr. 1978 69 p refs
(Contract W-7405-eng-26)
(ORNL/CON-15) Avail: NTIS HC A04/MF A01

The structure and forecasting accuracy of a disaggregated model of commercial energy use recently developed is described. The model forecasts annual commercial energy use by ten building types, five end uses, and four fuel types. Both economic (utilization rate, fuel choice, capital-energy substitution) and technological factors (equipment efficiency, thermal characteristics of buildings) are explicitly represented in the model. Model parameters were derived from engineering and econometric analysis. The model was then validated by simulating commercial energy use over the 1970-1975 time period. The model performs well both with respect to size of forecast error and ability to predict turning points. The model was then used to evaluate the energy-use implications of national commercial buildings standards based on the ASHRAE 90-75 recommendations. ERA

N78-33571# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
CENTRAL RECEIVER SOLAR THERMAL POWER SYSTEM, PHASE 1. CDRL ITEM 2, PILOT PLANT PRELIMINARY DESIGN REPORT. VOLUME 2: SYSTEM DESCRIPTION AND SYSTEM ANALYSIS
R. W. Hallet, Jr. and R. L. Gervais Oct. 1977 534 p refs
(Contract EY-76-C-03-1108)
(SAN-1108-8/1-Vol-2; MDC-G-6776-Vol-2) Avail: NTIS HC A23/MF A01

An active system analysis and integration effort was conducted. Initial program requirements were transformed into a preliminary system design. Subsystem requirements for subsystem design and test activity were generated. The final preliminary design was reviewed to ensure that the subsystems were operationally compatible and capable of producing electricity at the lowest possible cost per unit of energy. ERA

N78-33572# Los Alamos Scientific Lab., N. Mex.
THERMAL DRAWDOWN AND RECOVERY OF SINGLY AND MULTIPLY FRACTURED HOT DRY ROCK RESERVOIRS
R. Wunder and H. Murphy Apr. 1978 18 p refs
(Contract W-7405-eng-36)
(LA-7219-MS) Avail: NTIS HC A02/MF A01

A computer code was written to solve the differential equations for rock-water heat conduction and convection by finite differences. Temperature versus time functions for multiple fractures separated by various spacings are presented in dimensional and in nondimensional plots. The results were specialized for the limiting case of a single fracture in unbounded rock and for the other limiting case where the rock is so extensively fractured that thermal breakthrough phenomena can occur. Fracture temperatures were calculated during the thermal recovery following various extraction periods. For the single-fracture case these temperature recoveries could, with slight approximation, be represented as a single curve depending only upon the ratio of the total elapsed time and the extraction time. ERA

N78-33573# Ocean Data Systems, Inc., Monterey, Calif.
OTEC THERMAL RESOURCE REPORT FOR HAWAII
Oct. 1977 61 p refs
(Contract EG-77-C-01-4028)
(TID-27950) Avail: NTIS HC A04/MF A01

Most probable monthly temperature profiles from surface to 1500 meter depths were developed for eight one-degree latitutde-longitude squares off Hawaii. These ocean areas are characterized by remarkably homogeneous temperature conditions and small variability at all depths. In particular, a temperature differential in excess of 20 C exists between the surface layer and the 1000 meter depth and the entire year in several of the areas. An inventory summary is included of the temperature observations available in the area, as well as overall bathymetric information. The monthly temperature data are provided in tabular form and as plots of temperature differential versus depth for each latitude-longitude square. ERA

N78-33574# Kaman Sciences Corp., Colorado Springs, Colo.
PHOENIX HOUSE: SOLAR-ASSISTED HEAT PUMP SYSTEM EVALUATION Final Report, Mar. 1978
D. M. Jardine and D. W. Jones Mar. 1978 73 p refs Sponsored by EPRI
(EPRI-ER-712) Avail: NTIS HC A04/MF A01

Solar electric heating systems, their testing, and their electric system interfacing with the city of Colorado Springs municipal utility are examined. Thermal load is dynamic and changes characteristics as residential buildings age. Performance characteristics of an operational ground-coupled thermal energy storage system linked to fluid-cooled solar collectors and a series liquid-to-air heat pump are analyzed. Validated operational temperature boundary heat transfer coefficients for the storage system are developed using seasonal performance data generated at the Phoenix Project. The impact on the city utility's electric system is developed for connecting various types of solar and electric-heating systems in various quantities from 1978 through 1984. The main impact statement centers on the average cost per kWh of generating and delivering electric power to all classes of customers when the heating systems are connected in various quantities. Heating-system load factors, and their impact on the utility's electric system load factor are analyzed. ERA

N78-33575# Colorado School of Mines, Golden. Dept. of Engineering Physics.
OPEN CYCLE OCEAN THERMAL ENERGY CONVERSION: A PRELIMINARY ENGINEERING EVALUATION
A. D. Watt, F. S. Mathews, and R. E. Hathaway 31 Dec. 1977 132 p refs
(Contract EY-76-S-04-3723)
(ALO-3723-76/3) Avail: NTIS HC A07/MF A01

The following subjects are covered: physical environment, system layout, warm water loop, turbine/generator, cold water loop, system performance and cost, and areas of major uncertainty. ERA

N78-33576# Burns and McDonnell, Kansas City, Mo.
ASSESSMENT OF THE FUEL CELL'S ROLE IN SMALL UTILITIES Final Report
Peter Steitz, G. Mayo, D. Taylor, and H. Lehman Feb. 1978 210 p
(EPRI Proj. 918)
(EPRI-EM-696-Vol-1) Avail: NTIS HC A10/MF A01

Fuel cell characteristics most important to ensuring its success in the small utility market were identified. Areas studied were the: (1) analysis of small utility characteristics; (2) selection of six reference systems and expansion from 1980 to 2000 with conventional generation; (3) expansion of the six reference systems with five fuel cell types and comparison with conventional expansions; (4) determination of threshold values for key fuel cell characteristics; and (5) quantification of the potential benefits associated with certain of the fuel cell's unique features. Results show that the fuel cell has the potential for significant penetration into the small utility market, competing with conventional generation from the base load to the intermediate and peaking ranges of operation, especially if the characteristics specified for the advanced fuel cells can be achieved. The major potential limitations on the utilization of fuel cells are oil availability and price. ERA

N78-33577# Exxon Research and Engineering Co., Linden, N. J.
CATALYST SINTERING STUDIES Interim Report
Y. C. Pan, S. C. Fung, and G. Ciprios Mar. 1978 155 p refs Sponsored by DOE
(EPRI-EM-661) Avail: NTIS HC A08/MF A01

Methods to retard the loss of catalyst surface area, and therefore, retard the loss of catalytic activity, in phosphoric acid fuel cells are described. Phosphoric acid fuel cells use platinum catalysts dispersed as small crystallites on carbon supports. These crystallites are meta-stable and tend to grow to larger size (sinter) with lower surface area due to surface free energy considerations. The nature of support substrates, catalyst preparation method addition of adsorbed high valence cations and addition of potentially stabilizing components were studied. Platinum sintering rates were significantly different for various support systems. A very promising high surface area activated carbon was discovered which showed no measureable loss of platinum surface area after 1002 hours exposure to standard sintering conditions. ERA

N78-33578# Cantor (Irwin G.) Office, New York, N. Y.
INVESTIGATION OF ALTERNATE TYPES OF WATER-STORAGE COMPONENTS TO BE UTILIZED IN CONJUNCTION WITH THE ACES SYSTEM
Dec. 1977 78 p refs
(Contract W-7405-eng-26)
(ORNL/Sub-78/14233/1) Avail: NTIS HC A05/MF A01

Major areas investigated were: cost of the tank, and integration with the construction project. Nationwide tank building capability, and average costs are given. Costs of free-standing tanks were found to average $2.00/cu. ft. for a 500 cu ft. tank and $1.37/cu. ft. for a 3000 cu. ft. tank. The least-costly tanks were those which are field constructed and fully integrated with the project design. Traditional materials and procedures (masonry and concrete) offer the greatest flexibility and lowest cost. Such integration can create cost savings of approximately 50% since load bearing walls can fulfill additional structural (foundation) requirements. The least costly method of tank construction available was foam-form block, a proprietary system using preshaped polystyrene open cell blocks between which are placed reinforcing steel and concrete. ERA

N78-33579# Department of Energy, Washington, D. C.
ENVIRONMENTAL DEVELOPMENT PLAN (EDP): ENERGY STORAGE SYSTEMS, FY 1977
Lynne Holt, Richard Jones, and Graham Hagey Mar. 1978 145 p refs
(DOE/EDP-0015) Avail: NTIS HC A07/MF A01

The physical, biological, social, cultural, health and safety environmental concerns associated with energy storage are examined. The requirements and actions needed to resolve these concerns, and a time-phased plan for the evaluation and mitigation of negative environmental impacts are presented. A framework is provided for incorporating environmental considerations into the planning process at the appropriate stage, resolving environmental issues concurrently with the technology development, and

assuring that adverse environmental effects are mitigated through sound technological design. ERA

N78-33580# Completion Technology Co., Houston, Tex.
GEOTHERMAL WELL COMPLETIONS: AN OVERVIEW OF EXISTING METHODS IN FOUR TYPES OF DEVELOPMENTS
Robert E. Snyder Jan. 1978 128 p refs
(Contract EY-76-C-04-0789)
(SAND-78-7010) Avail: NTIS HC A07/MF A01

Existing practices and capabilities for completing wells for geothermal application in each of four categories of geothermal environments are discussed. Included are steam wells in hard, fractured rocks (The Geysers, California), hot water wells sedimentary formations (Imperial Valley, California), hot, dry impermeable rocks with circulating water systems (Valles Caldera, New Mexico), and geopressured, geothermal water wells with associated hydrocarbon production on the U.S. Gulf Coast. ERA

N78-33581# Bureau of Mines, Washington, D. C.
PROJECTS TO EXPAND FUEL SOURCES IN EASTERN STATES: AN UPDATE OF INFORMATION CIRCULAR 8726. SURVEY OF PLANNED OR PROPOSED COAL MINES, COAL AND NONCOAL CONVERSION PLANTS, ELECTRIC GENERATING PLANTS, OIL REFINERIES, URANIUM ENRICHMENT FACILITIES, AND RELATED INFRASTRUCTURE, IN STATES EAST OF THE MISSISSIPPI RIVER (AS OF JULY 1977)
David C. Benson and Frank J. Doyle 1978 156 p refs
(BM-IC-8765) Avail: NTIS HC A08/MF A01

Tables listing the name, location and other pertinent data concerning certain fuel-related projects are presented. Information on projects involving the proposed or planned development of fuel resources, as well as the development of storage, transportation, and conversion facilities is included. Of the total 535 projects for which information is provided, 429 concern coal mines and electric generating plants. ERA

N78-33582# California Univ., Berkeley. Lawrence Berkeley Lab.
Cu/SUB x/S-(Cd, Zn)S PHOTOVOLTAIC SOLAR ENERGY CONVERTERS Quarterly Report, Jul. - Sep. 1977
T. M. Peterson, B. L. Chin, K. Seshan, and J. Washburn Nov. 1977 26 p refs
(Contract W-7405-eng-48)
(HCP/T7405-1; QR-2) Avail: NTIS HC A03/MF A01

Reproducible growth of uncracked, thick films of (Cd,Zn)S was accomplished on the As(antis 111) face of GaAs substrates and on substrates tilted approximately 14 deg off of (antis 111). Modifications to the hot wall deposition apparatus were made to eliminate the trace impurities found at the perimeter of the films. Techniques for transmission electron microscope specimen preparation were developed. Results yielded evidence supporting Ga-face film cracking by an interfacial layer of GaS. The spectral response portion of the device measurement apparatus is operational. The elastic tunneling calculations agree with experimental results for I-V characteristics of illuminated cells. ERA

N78-33583# California Polytechnic State Univ., San Luis Obispo.
RESEARCH ON THE APPLICATION OF SOLAR ENERGY TO INDUSTRIAL DRYING OR DEHYDRATION PROCESSES Final Phase Report
Mar. 1977 234 p refs
(Contract EY-76-C-05-5123)
(ORO-5123-1) Avail: NTIS HC A11/MF A01

The dehydration operation is described. The system design and its economic analysis are discussed. The system analysis covers the solar collectors, fan and ducting selection, rock storage design, heat recovery, control system, system simulation, and the monitoring system. The construction costs are discussed thoroughly. The construction design is presented including drawings. ERA

N78-33584# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.
AMORPHOUS SEMICONDUCTORS IN PHOTOVOLTAIC AND SOLAR THERMAL CONVERSION
Richard W. Griffith 1978 6 p refs Presented at Intern. Solar Energy Congr., New Delhi, 16 Jan. 1978
(Contract EY-76-C-02-0016)
(BNL-24216; Conf-780114-7) Avail: NTIS HC A02/MF A01

Amorphous semiconductor materials promise to play an important role in solar energy conversion. For photovoltaic applications, acceptable efficiencies eta in large-area Schottky cells may be possible if hole transport in a-Si can be improved. Indeed, in very small-area cells (approx. 1 sq. mm)reasonable upper limits eta approximately 6% were reported in the literature. For solar thermal applications, studies on Si/sub 1-x/B sub x/ alloys point toward the realization of solar coatings that are stable at high temperatures, and that satisfy the dual requirement of high solar absorptance alpha/sub s/ and low infrared emittance e. ERA

N78-33585# Argonne National Lab., Ill.
DESIGN OF CPC PHOTOVOLTAIC SOLAR COLLECTORS
R. M. Graven, A. J. Gorski, and W. R. McIntire 1978 6 p refs Presented at Intern. Solar Energy Congr., New Dehli, 16 Jan. 1978
(Contract W-31-109-eng-38)
(CONF-780114-8) Avail: NTIS HC A02/MF A01

Two new photovoltaic solar collectors were designed, built and tested. A substantial improvement in performance was achieved in that they produce more electrical power and use significantly less photovoltaic material per unit area than the present state-of-the-art flat panel arrays. A reflective style Compound Parabolic Concentrator (CPC) optical system was used for one collector, and a dielectric style (DCPC) optical system was used for the other collector to concentrate sunlight onto custom designed photovoltaic solar cells. For these two panels only periodic angular adjustments are required, which eliminates the need for two-axis tracking. A modular design of individual sub-units containing an array of series and parallel circuits allows a user to select a variety of operating conditions. ERA

N78-33586# Los Alamos Scientific Lab., N. Mex.
SOLAR-THERMOCHEMICAL PRODUCTION OF HYDROGEN FROM WATER
K. E. Cox and M. G. Bowman 1978 16 p refs Presented at Solar Thermal Test Facilities Users Assoc. Meeting, Golden, Colo., 11 Apr. 1978
(Contract W-7405-eng-36)
(LA-UR-78-1052; Conf-780447-2) Avail: NTIS HC A02/MF A01

Large scale hydrogen production using solar energy for the decomposition of water by thermochemical cycles, electrolysis, or a hybrid combination of these methods is reviewed. The potential higher efficiency and lower cost for thermochemical methods, versus the overall electrolysis was recognized. The criteria for the selection of an appropriate thermochemical cycle for matching with a high temperature solar heat source are detailed. Advantages of a thermochemical cycle based on a solid sulfate decomposition that makes use of isothermal high temperature energy is detailed, and a plan for the implementation of such a cycle on a central tower solar receiver is given. ERA

N78-33587# Black and Veatch Consulting Engineers, Kansas City, Mo.
SOLAR-THERMAL CONVERSION TO ELECTRICITY UTILIZING A CENTRAL RECEIVER, OPEN-CYCLE GAS TURBINE DESIGN Final Report
J. C. Grosskreutz Mar. 1978 226 p refs Sponsored by EPRI
(EPRI-ER-652) Avail: NTIS HC A11/MF A01

A program to develop a solar/electric power plant which utilizes an open cycle gas turbine as the prime mover is discussed. A conceptual design for a commercial-scale plant, with a nominal rating of 60 MWe, was prepared. The characteristics of the design, which employs an elevated central receiver surrounded by a field of heliostats, are presented. Energy storage, both buffer and long-term is provided by fossil fuels. The fuel, either oil or gas, is burned in combustors which are in a parallel arrangement with the solar receivers. The turbine inlet gas temperature is 982 to 1066 C. Because these temperatures preclude the use of any available metal for the heat transfer surface, ceramics are employed. Experiments verified the suitability of silicon carbide for an application of this type and also verified the analytic

methodology which had been used in the receiver design activities. Preliminary estimates of the physical and operating characteristics of a bench model solar receiver employing silicon carbide tubes, were developed. ERA

N78-33588# Argonne National Lab., Ill.
USE OF MICROWAVE ENERGY IN CONJUNCTION WITH FLUIDIZED BED REACTORS
Edward P. Lynch 1977 13 p Presented at the 3d Intern. Conf. of Environ. Industries, Dayton, Ohio, 29 Nov. 1977
(Contract W-31-109-eng-38)
(CONF-771125-3) Avail: NTIS HC A02/MF A01

A pilot plant for demonstrating the use of microwave heating in the operation of fluidized bed reactors is proposed. Fluidized bed reactors are widely used in the chemical, petrochemical, and petroleum industries. Microwave heating of particles in a fluidized bed has the advantages that heat is generated within individual particles, no combustion gases or outside contaminants are in contact with the particles, and no differential temperature is required for heat transfer to a particle in the radiation field. It is believed that the use of microwave energy for particle heating would result in fluidized bed operations with the same or improved efficiency at appreciably lower temperatures. ERA

N78-33589# California Univ., Livermore. Lawrence Livermore Lab.
ANALYSIS OF OFF-GUIDEWAY ENERGY STORAGE/ PROPULSION SYSTEMS FOR DUAL MODE TRANSIT SYSTEMS
Ivan J. Sacks 9 Mar. 1978 25 p refs Presented at the Advanced Transit Assoc. Intern. Conf., Indianapolis, 25-28 Apr. 1978
(Contract W-7405-eng-48)
(UCRL-80874; Conf-780426-1) Avail: NTIS HC A02/MF A01

Some evaluation criteria and a method for combining these criteria for the selection of an energy storage propulsion system for off guideway operation of a dual mode transit system are presented. In addition, technical options for these energy storage propulsion systems are discussed. These options are drawn from mechanical, chemical, and electrical energy storage systems. The selection criteria discussed are used to select attractive near term system option. ERA

N78-33590# Energy Development Associates, Madison Heights, Mich.
DEVELOPMENT OF HIGH-EFFICIENCY COST-EFFECTIVE, ZINC-CHLORINE BATTERIES FOR UTILITY PEAK-SHAVING, 1976 Interim Report
Philip C. Symons Mar. 1978 277 p
(EPRI-EM-711) Avail: NTIS HC A13/MF A01

Principle thrusts of this program were battery scaleup by a factor of twenty from earlier work and investigation of the economics of zinc-chlorine peak-shaving batteries located at utility substations. Development programs on cell performance, electrode research, and materials of construction were conducted in support of these objectives. A battery was designed, built, and tested which delivered 18 kWh dc at an electrochemical energy efficiency of 60%. Two smaller systems were built and tested in order to permit informed selection of the chlorine electrode material. Porous graphite was chosen. The cycle-testing of two battery systems are successfully automated. Two conceptual designs were prepared. A detailed cost breakdown was provided for each design. ERA

N78-33591# Little (Arthur D.), Inc., Cambridge, Mass.
ENERGY EFFICIENCY AND ELECTRIC MOTORS
Apr. 1978 173 p
(HCP/M50217-01) Avail: NTIS HC A08/MF A01

The underlying hypothesis of this investigation is that efficiency ratings are not being given proper consideration in the selection and purchase of electric motors. The study is concerned with five tasks: (1) equipment characterization concerned with standard and built-in electric motors applied to commercial and industrial process equipment and including AC single-phase and AC polyphase; (2) market characterization, identifying the basis of motor choice by users; (3) tracing the historic progression of motor efficiencies and projected future trends; (4) technological assessing and economic constraints; (5) developing policy option scenarios. ERA

N78-33592# Gulf Research and Development Co., Pittsburgh, Pa.
PASSENGER CAR FUEL ECONOMY IN SHORT TRIP OPERATION Technical Progress Report, 1 May 1977 - 30 Nov. 1977
C. H. Phoebe Nov. 1977 25 p refs
(Contract EC-77-C-02-4248)
(COO-4248-1) Avail: NTIS HC A02/MF A01

A program is described to provide a base line for studies of short-trip fuel economy that will eventually be needed to evaluate alternative power plants and fuels. Objectives are: the evaluation of methods devised to provide fuel utilization, and comparison of conventional gasoline with a special fuel blend aimed at improved short-trip economy. The test design, selection of the fuel blends, driving cycle, operating procedure, test equipment, selection of the test vehicles, and data handling methods are outlined. Fuel consumption measurements were made on four vehicles operated on a chassis dynamometer at 0 F and 90 F. ERA

N78-33593# Ocean Data Systems, Inc., Monterey, Calif.
OTEC THERMAL RESOURCE REPORT FOR PUERTO RICO
Oct. 1977 46 p
(Contract EG-77-C-01-4028)
(TID-27953) Avail: NTIS HC A03/MF A01

Most probable monthly temperature profiles from surface to 1500-meter depths were developed for four one-degree latitude-longitude squares off Puerto Rico for Ocean Thermal Energy Conversion (OTEC) purposes. These ocean areas are characterized by remarkably homogeneous temperature conditions and small variability at all depths. In particular, a temperature differential (delta T) in excess of 20 C exists between the surface layer and the 1000-meter depth the entire year in all of the areas. An inventory summary of the temperature observations available in the area, as well as overall bathymetric information are included. The monthly temperature data are provided in tabular form and as plots of delta T versus depth for each latitude-longitude square. ERA

N78-33594# Department of Energy, Washington, D. C. Div. of Solar Technology.
FEDERAL WIND ENERGY PROGRAM. PROGRAM SUMMARY
Jan. 1978 78 p
(DOE/ET-0023/1) Avail: NTIS HC A05/MF A01

The objective of the Federal Wind Energy Program is to accelerate the development of reliable and economically viable wind energy systems and enable the earliest possible commercialization of wind power. To achieve this objective for small and large wind systems requires advancing the technology, developing a sound industrial technology base, and addressing the non-technological issues which could deter the use of wind energy. This summary report outlines the projects being supported by the program through FY 1977 toward the achievement of these goals. It also outlines the program's general organization and specific program elements. ERA

N78-33595# Score, Inc., Cambridge, Mass.
THE 1976 ENERGY RESOURCE ALTERNATIVES II COMPETITION Final Report
R. A. McGill, M. Iannucilli, J. Marshal, J. H. Sununu, J. E. Eschbach, J. Anson, D. Wark, and D. E. Stock Oct. 1977 260 p
(Contract EY-76-C-02-2698)
(COO-2698-2) Avail: NTIS HC A12/MF A01

Descriptions of all the entries in the competition are presented. Competition rules and judging procedures are described. Entries consisted of team efforts from colleges and universities. The competition called for the student teams to develop means for producing electrical power sufficient to meet the needs of a single family home, using an energy source other than oil or natural gas. The electric power produced had to be economically realistic when compared to present energy sources. ERA

N78-33596# Sandia Labs., Albuquerque, N. Mex.
TORQUE RIPPLE IN A VERTICAL AXIS WIND TURBINE

R. C. Reuter, Jr. and M. H. Worstell Apr. 1978 45 p refs
(Contract EY-76-C-04-0789)
(SAND-78-0577) Avail: NTIS HC A03/MF A01

Torque ripple is a name given to time variations in torque which are propagated through the drive train of wind energy conversion systems. An analytical and experimental investigation of torque ripple in a Darrieus vertical axis wind turbine is presented. An analytical model of the turbine is described and numerical results from a solution to the equations of this model are compared to experimental results obtained from the existing DOE/Sandia 17 meter vertical axis wind turbine. Discussions on the source of torque ripple, theoretical and experimental correlation, and means of suppressing its magnitude are included. ERA

N78-33597# Energy Research and Development Administration, Washington, D. C.
ERDA FACILITIES: A NATIONAL RESOURCE FOR RESOLVING ENERGY PROBLEMS
10 Aug. 1977 370 p
(ERDA-77-80) Avail: NTIS HC A16/MF A01

Information about ERDA's management structure, program activities, staffing and funding levels is presented. The capabilities of each ERDA's facilities for responding to the nation's energy priorities are outlined. The text was designed for internal use as a management tool to aid in reorganization decision making and as a source of general information for new DOE employees. ERA

N78-33598# Biomass Energy Inst., Inc., Winnipeg (Manitoba).
BIOMASS ENERGY SUCCESS STORIES: A PORTFOLIO ILLUSTRATING CURRENT ECONOMIC USES OF RENEWABLE BIOMASS ENERGY
Mar. 1978 57 p
(Contract EG-77-X-10-0285)
(HCP/T0285-02) Avail: NTIS HC A04/MF A01

Twenty-one illustrations of the use of energy from biomass by the sugar, pulp and paper, manufacturing, and wood products industries and for space heating of residences and institutional buildings are presented. Uses include the combustion of wood wastes and sugarcane residues for production of industrial electric power needs, steam production for bleaching and dyeing operations, heat for industrial drying, and space heating. The six appendices give information on the overall availability of biomass and biomass residues in the U.S. and Canada. ERA

N78-33599# National Technical Information Service, Springfield, Va.
FUEL CONSUMPTION: TRANSPORTATION, VOLUME 1. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - 1978
Audrey S. Hundemann Jul. 1978 193 p
(NTIS/PS-78/0707/6) Avail: NTIS HC $28.00/MF $28.00 CSCL 10A

Fuel consumption by automobiles, trucks, buses, and general aviation aircraft is discussed. Topic areas cover the effect of road conditions, traffic conditions, and emission controls on fuel economy; projected growth and problems facing air transportation; energy efficiency of various urban transportation modes; energy use forecasts; and projections of supply and demand in the transporation sector. This updated bibliography contains 187 abstracts. GRA

N78-33600# National Technical Information Service, Springfield, Va.
FUEL CONSUMPTION: TRANSPORTATION, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1977 - Jun. 1978
Audrey S. Hundemann Jul. 1978 115 p Supersedes NTIS/PS-77/0552
(NTIS/PS-78/0708/4; NTIS/PS-77/0552) Avail: NTIS HC $28.00/MF $28.00 CSCL 10A

This updated bibliography contains 109 abstracts dealing with fuel consumption by automobiles, trucks, buses, and general aviation aircraft. The effect of road conditions, traffic conditions, and emission controls on energy efficiency is covered. Projected growth and problems facing air transportation and energy use forecasts and projections of supply and demand in the transportation sector are included. GRA

N78-33601# National Technical Information Service, Springfield, Va.
FUEL CONSUMPTION: INDUSTRIAL, RESIDENTIAL, AND GENERAL STUDIES. VOLUME 1. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1965 - 1978
Audrey S. Hundemann Jul. 1978 166 p
(NTIS/PS-78/0709/2) Avail: NTIS HC $28.00/MF $28.00 CSCL 10A

A bibliography containing 162 abstracts concerning research on fuel supply, demand, shortages, and conservation through effective utilization is presented. Energy consumption in the agricultural sector, fuel substitution, economic studies, and environmental concerns relating to energy consumption are also reviewed. GRA

N78-33602# National Technical Information Service, Springfield, Va.
FUEL CONSUMPTION: INDUSTRIAL, RESIDENTIAL, AND GENERAL STUDIES. VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1977 - Jun. 1978
Audrey S. Hundemann Jul. 1978 136 p Supersedes NTIS/PS-77/0551; COM-74-11102
(NTIS/PS-78/0710/0; NTIS/PS-77/0551; COM-74-11102) Avail: NTIS HC $28.00/MF $28.00 CSCL 10A

A bibliography containing 130 abstracts concerning research on fuel supply, demand, shortages and conservation through effective utilization is presented. Energy consumption in the agricultural sector, fuel substitution, economic studies, and environmental concerns relating to energy consumption is reported. Bibliographies on electric power consumption and fuel consumption by transportation are also included. GRA

N78-33603# National Technical Information Service, Springfield, Va.
LITHIUM BATTERIES, VOLUME 2. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1975 - Jul. 1978
Mona F. Smith Jul. 1978 246 p Supersedes NTIS/PS-77/0638; NTIS/PS-76/0543; and NTIS/PS-75/471
(NTIS/PS-78/0660/7; NTIS/PS-77/0638; NTIS/PS-76/0543; NTIS/PS-75/471) Avail: NTIS HC $28.00/MF $28.00 CSCL 10C

A bibliography containing 241 abstracts concerning research on design, development, components, testing, corrosion, electrolytes, sealing, and hazards of lithium cells is presented. Batteries studied include lithium organic cells, lithium sulfur cells, lithium--water-air cells, and lithium nickel fluoride cells. Applications cover use in spacecraft, electric vehicles, off peak energy storage, and forklift trucks. GRA

N78-33604# National Technical Information Service, Springfield, Va.
LITHIUM BATTERIES. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jul. 1978
Mona F. Smith Jul. 1978 187 p Supersedes NTIS/PS-77/0639, and NTIS/PS-76/0544
(NTIS/PS-78/0661/5; NTIS/PS-77/0639; NTIS/PS-76/0544) Avail: NTIS HC $28.00/MF $28.00 CSCL 10C

A bibliography containing 180 abstracts concerning studies on design, development, components, corrosion, and hazards is presented. Lithium batteries with sulfides, chlorine, thionyl chloride, organic compounds, and water are described. Applications cover use of lithium cells in pacemakers, spacecraft, electric vehicles, and off peak energy storage. GRA

N78-33605# National Technical Information Service, Springfield, Va.
LEAD BATTERIES. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jul. 1978
Mona F. Smith Jul. 1978 130 p Supersedes NTIS/PS-77/0633; NTIS/PS-76/0549; and NTIS/PS-75/472
(NTIS/PS-78/0689/6; NTIS/PS-77/0633; NTIS/PS-76/0549; NTIS/PS-75/472) Avail: NTIS HC $28.00/MF $28.00 CSCL 10C

A bibliography containing 124 abstracts concerning the design, development, components, fabrication, chemistry, and testing of lead batteries is presented. Specific applications for spacecraft consumer products and electric vehicles are presented.

Studies on lead recovery from battery scrap were reviewed. Several abstracts on lead toxicity in industrial plants are also cited. GRA

N78-33606# National Technical Information Service, Springfield, Va.
LEAD BATTERIES. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jul. 1978
Mona F. Smith Jul. 1978 270 p Supersedes NTIS/PS-77/0634; and NTIS/PS-76/0550
(NTIS/PS-78/0690/4; NTIS/PS-77/0634; NTIS/PS-76/0550) Avail: NTIS HC $28.00/MF $28.00 CSCL 10C

A bibliography containing 262 abstracts concerning worldwide research on lead battery components, charging, corrosion, and testing is presented. The majority of studies concern battery use in electric vehicles. Studies on lead recovery from battery scrap and air pollution at battery factories are also included. GRA

N78-33607# General Accounting Office, Washington, D. C. Energy and Minerals Div.
THE MULTIPROGRAM LABORATORIES: A NATIONAL RESOURCE FOR NONNUCLEAR ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION Report to the Congress
22 May 1978 101 p refs
(PB-281265/9; EMD-78-62) Avail: NTIS HC A06/MF A01 CSCL 10A

The multiprogram laboratories and their enormous scientific and technical potential for the development of nonnuclear energy technologies are examined. The eight laboratories represent a cumulative capital investment of over $3 billion. They have a diversity of scientific and technical resources, manpower, and plant facilities for developing new energy technologies. Suggestions for using these laboratories in nonnuclear energy in a manner which would improve their working relationships with other research entities are presented. GRA

N78-33608# National Technical Information Service, Springfield, Va.
HELIOSTAT SYSTEMS DESIGN AND OPERATION. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jun. 1978
Audrey S. Hundemann Aug. 1978 44 p
(NTIS/PS-78/0842/1) Avail: NTIS HC $28.00/MF $28.00 CSCL 10A

The design and use of heliostats in solar central receiver thermal power systems are discussed in abstracts from worldwide literature. Topic areas include heliostat systems performance, efficiency, and optimization. Emphasis of the bibliography is on basic research. This bibliography contains 38 abstracts. GRA

N78-33609# National Technical Information Service, Springfield, Va.
SOLAR ENERGY CONCENTRATOR DESIGN AND OPERATION. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jun. 1978
Audrey S. Hundemann Aug. 1978 174 p
(NTIS/PS-78/0839/7) Avail: NTIS HC $28.00/MF $28.00 CSCL 10A

Worldwide research on the design and operation of various types of solar energy concentrators is discussed. Topic areas cover thermal and optical performance of Fresnel lenses, compound parabolic concentrators, fixed mirror concentrators, and planar reflector enhancement of flat plate collector systems. A few abstracts deal with V-trough concentrators and methods to calculate performance of concentrators. A separate published search on heliostat systems is available. (This bibliography contains 167 abstracts.) GRA

N78-33610# National Technical Information Service, Springfield, Va.
FLAT PLATE SOLAR COLLECTOR DESIGN AND PERFORMANCE. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jun. 1978
Audrey S. Hundemann Aug. 1978 150 p
(NTIS/PS-78/0841/3) Avail: NTIS HC $28.00/MF $28.00 CSCL 10A

Citations from worldwide literature on the design, thermal performance, and optimization of air- and liquid-type flat plate collectors are covered. Topic areas include heat loss and heat transfer, effect of orientation, corrosion protection, optical coatings, enhancement of performance through the use of planar reflectors, and the effect of honeycomb layers on collector performance. Grooved corrugated, or V-trough collectors are studied. Abstracts dealing with methods of measuring the performance of flat plate collectors and computer optimization studies are included. (This bibliography contains 144 abstracts.) GRA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N78-33611 California Univ., Berkeley.
THE NATURE AND FORMATION OF NITROGENOUS AIR POLLUTANT EMISSIONS FROM COMBUSTION SYSTEMS Ph.D. Thesis
Ronald Douglas Matthews 1977 236 p
Avail: Univ. Microfilms Order No. 7812681

The emissions of fuel-derived N-species, especially NO, from catalytic combustors was investigated. Combustion parameters which were varied include equivalence ratio, adiabatic flame temperature, and fuel nitrogen concentration. For direct comparison with fuel rich catalytic combustion, the same species were monitored in the exhaust of a flat flame burner operating under the same conditions. This comparison allows some estimation of the extent to which heterogeneous reactions are controlling the conversion of fuel nitrogen. Measurements of catalyst temperature, combustion efficiency, and emissions of CO and CO2 are presented. The atmospheric chemistry and toxicology of nitrogenous air pollutants which have been identified in the emissions from combustion systems is also reviewed.
Dissert. Abstr.

N78-33612 Pennsylvania State Univ., University Park.
ENVIRONMENTAL NOISE: THE EFFECTS OF INFORMATION OVERLOAD AND CONTROL OVER THE WORK ENVIRONMENT ON PERFORMANCE DURING AND AFTER EXPOSURE Ph.D. Thesis
David Michael Dejoy 1978 141 p
Avail: Univ. Microfilms Order No. 7812040

The relationship between task performance and environmental noise was studied. Participants performed either a self paced (SP), experimenter paced-moderate (EM), or experimenter paced-overload (EO) dial monitoring task in the presence of either unpredictable intermittent noise, predictable intermittent noise or quiet. The task conditions were arranged so that the SP and EM tasks differed along the control dimensions but not in terms of information rate, while the EM and EO tasks varied along the information rate dimensions but not with respect to control. A total of 180 participants were used, with 20 participants randomly assigned to each of the nine conditions. Ratings of expressed mood and ratings of the noise and task conditions were also obtained. All participants completed two post-stressor tasks: a frustration tolerance task and a performance efficiency task.
Dissert. Abstr.

N78-33613 George Washington Univ., Washington, D. C.
ANNOYANCE DUE TO THE INTERACTION OF COMMUNITY NOISE SOURCES Ph.D. Thesis
Clemans Ancelan Powell, Jr. 1978 289 p
Avail: Univ. Microfilms Order No. 78-15803

The effects of a road traffic noise background on judgments of individual aircraft noise events were studied. The results indicate that aircraft noise annoyance was reduced by increased levels of traffic noise. Additional experiments were conducted to develop methodology for obtaining annoyance judgments to sessions of noise representative of situations with many aircraft noise events per day and to determine if the total noise energy concept was satisfactory in explaining subjects' total annoyance to combined noises. These experiments indicated that the total noise energy concept was not satisfactory. A model which provides for the summation and inhibition of annoyance for combined noises was developed and subsequently tested with a final experiment:

good qualitative and quantitative agreement was found.
Dissert. Abstr.

N78-33614 Texas A&M Univ., College Station.
LIGHT HYDROCARBONS IN MARINE SEDIMENTS Ph.D. Thesis
Bernie Boyd Bernard 1978 154 p
Avail: Univ. Microfilms Order No. 7817165

Concentrations of the C1-C3 hydrocarbons and stable carbon isotope compositions of methane in recent sediments and seep gases of the Texas-Louisiana shelf-slope region were determined. These gases were produced by both microbial and thermocatalytic processes. A geochemical model based on these two parameters is used to show that natural gas compositions can be altered due to mixing of gases from the two sources as well as by microbial action and migration through sediments. Interstitial concentrations of ethane, ethane, propene, and propane are relatively constant with depth in the upper two meters of shelf, slope, and abyssal sediments, decreasing progressively from 160, 100, 110, and 60 nl/liter in near-shore sediments, to fairly uniform levels of 80, 25, 30, and 25 nl/liter downslope, respectively. As sulfate disappears, ethane and propane concentrations increase more than ten-fold but propane subsequently disappears. These patterns suggest that ethane and propane are also microbially produced to some extent in recent sediments and propane is subsequently consumed. Dissert. Abstr.

N78-33615# MAN-Acoustics and Noise, Inc., Seattle, Wash.
COMMERCIAL AIRPORT OPERATIONS AND COMMUNITY NOISE CRITERIA Final Report
J. E. Mabry and B. M. S. Sullivan Mar. 1978 76 p refs
(Contract DOT-FA77WAI-723)
(AD-A057451; MAN-1031; FAA-RD-78-36) Avail: NTIS HC A05/MF A01 CSCL 20/1

The responses of 48 persons exposed to seven different simulated commercial airport noise environments were examined. Each exposure period was of 1 to 11/2 hours duration and subjects experienced and rated eight of these noise exposure periods. The test environment simulated a conventional living room environment. Conclusions are: (1) noise exposure from a newer aircraft fleet mix (circa 1980) is more acceptable than that from an old fleet mix (circa 1965); (2) commonly used noise exposure methods such as NEF, Leq, and mean peak dBA are level dependent; (3) depending on the noise exposure method used, 2.5 to 4.0 dB is perceived as a reliable change in noise exposure; (4) predictive capability of a noise exposure method is a function of the engineering calculation procedure employed to weight the acoustic energy, and (5) mean peak level exposure methods have greater predictive capability than energy summation methods. S.B.S.

N78-33616*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LABORATORY AND FIELD MEASUREMENTS OF UPWELLED RADIANCE AND REFLECTANCE SPECTRA OF SUSPENDED JAMES RIVER SEDIMENTS NEAR HOPEWELL, VIRGINIA
Charles H. Whilock, William G. Witte, E. A. Gurganus, and J. W. Usry Oct. 1978 30 p refs
(NASA-TP-1292; L-12298) Avail: NTIS HC A03/MF A01 CSCL 13B

Spectral reflectance characteristics of suspended Bermuda Hundred and Bailey Bay bottom sediments taken from the Hopewell, Va., area were measured in the laboratory for water mixture total suspended solids concentrations between 4 and 173 parts per million. Field spectral reflectance measurements were made of the James River waters near Bermuda Hundred on two occasions. The results of these tests indicate that both Bermuda Hundred and Bailey Bay suspended sediments produce their strongest reflectance in the green and red regions of the spectrum. Author

N78-33617*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
QUANTITATIVE MAPPING BY REMOTE SENSING OF AN OCEAN ACID-WASTE DUMP
Craig W. Ohlhorst Oct. 1978 27 p refs
(NASA-TP-1275; L-11927) Avail: NTIS HC A02/MF A01 CSCL 13B

Results from quantitative analysis show that airplane remotely sensed spectral data can be used to quantify and map an acid-waste dump in terms of its particulate iron concentration. These same data, however, could not be used to map the dump in terms of total suspended solids, organic suspended solids, or inorganic suspended solids concentrations. A single-variable equation using the ratio of band 2 (440 to 490 nm) radiance to band 4 (540 to 580 nm) radiance was used to quantify the iron concentration in the acid-waste dump. The acid waste that was mapped varied in age from freshly dumped to 31/2 hr. Particulate iron concentrations in the acid waste were estimated to range up to 1.1 mg/l at a depth of 0.46 m. A classification technique was developed to identify pixels in the data set affected by sun glitter. Author

N78-33618*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OZONE CONCENTRATION IN THE CABIN OF A GATES LEARJET MEASURED SIMULTANEOUSLY WITH ATMOSPHERIC OZONE CONCENTRATIONS
Daniel Briehl and Porter J. Perkins Oct. 1978 20 p refs
(NASA-TP-1340; E-9653) Avail: NTIS HC A02/MF A01 CSCL 13B

A Gates Learjet Model 23 was instrumented with monitors to measure simultaneously the atmospheric and the cabin concentrations of ozone at altitudes up to 13 kilometers. Six data flights were made in February 1978. Results indicated that only a small amount of the atmospheric ozone is destroyed in the cabin pressurization system. Ozone concentrations measured in the cabin near the conditioned-air outlets were only slightly lower than the atmospheric ozone concentration. For the two cabin configurations tested, the ozone retention in the cabin was 63 and 41 percent of the atmospheric ozone concentration. Maximum cabin ozone concentration measured during these flights was 410 parts per billion by volume. Author

N78-33619# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
A POLLUTION ABATEMENT CONCEPT, RECLAMATION OF NAVAL AIR REWORK FACILITIES WASTE SOLVENT, PHASE 1
H. J. Lee, I. H. Custis, and W. C. Hallow 5 Apr. 1978 25 p refs
(WF57572401)
(AD-A055469; NADC-78028-60) Avail: NTIS HC A02/MF A01 CSCL 13/2

The NARFs were surveyed to determine the type and quantities of solvents used per year, method and/or disposal procedures. Six recoverable solvents, methyl ethyl ketone, Freon TF methylene chloride, trichloroethane, trichloroethylene and stoddard make up 87% of the solvents used at the NARFs. Reclamation of these solvents by a commercial reclaimer will save the Navy in excess of $1,000,000 per year in disposal and replacement costs. Author (GRA)

N78-33620# Army Construction Engineering Research Lab., Champaign, Ill.
COMPUTER-AIDED ENVIRONMENTAL IMPACT ANALYSIS FOR INDUSTRIAL, PROCUREMENT, AND RESEARCH DEVELOPMENT, TEST, AND EVALUATION ACTIVITIES: USER'S MANUAL Final Report
Susan E. Thomas, Ralph A. Mitchell, Robert E. Riggins, John J. Fittipaldi, and Edward W. Novak Jun. 1978 187 p refs
(DA Proj. 4A7-62720-A-896)
(AD-A056997; CERL-TR-N-43) Avail: NTIS HC A09/MF A01 CSCL 15/5

This manual and the associated information provided by the Environmental Impact Computer System (EICS) were prepared for proponents of Army industrial, procurement, and research, development, test, and evaluation activities to prepare adequate, comprehensive, and interdisciplinary environmental impact assessments and statements for their ongoing and proposed projects and programs. These procedures will enable the Army to meet the requirements of the National Environmental Policy Act (NEPA) and subsequent Army Regulations (AR 200-1). This manual discusses the philosophy behind the environmental impact assessment process; presents an overview of the Environmental

Technical Information System (ETIS); discusses the criteria and general approach for using the EICS; defines the EICS components; provides instructions for accessing the EICS functions listed above; and provides detailed procedures necessary to use the EICS output in the environmental impact assessment process and in preparing a formal Environmental Impact Assessment (EIA) or Environmental Impact Statement (EIS). Instructions and procedures herein that are related to the use of EICS replace those provided in the earlier user manuals of this series. GRA

N78-33621# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
SPECTROPHONE ANALYSIS OF GAS SAMPLES OBTAINED AT FIELD SITE
Christine Samuel, Charles Bruce, and Ralph Brewer Jun. 1978 52 p refs
(DA Proj. 1L1-61102-B-53A)
(AD-A057202; ERADCOM/ASL-TR-0009) Avail: NTIS HC A04/MF A01 CSCL 17/5

An exploratory study of the absorption of atmospheric gaseous samples from a White Sands Missile Range remote site was undertaken. The technique used a state-of-the-art laboratory spectrophone with gaseous samples which were obtained at the remote site in a highly purified stainless steel cylinder. Each sample was cryogenically pumped to obtain atmospheric pressure when the sample was expanded into the spectrophone. The purposes of the study were: To measure the absorption atmospheric gas at 3.5 to 3.8 micrometers and 9.2 to 10.8 micrometers wavelengths using, respectively, deuterium fluoride (DF) and carbon dioxide (CO2) lasers as high resolution spectral sources, and to determine whether the resulting spectral patterns could be analyzed (deconvolved) to determine the identity and concentration of the absorbing atmospheric molecules. These results are directly applicable to Army high energy laser and electro-optical sensor modeling of infrared (IR) transmission in window regions. GRA

N78-33622# Department of Energy, Washington, D. C.
ENVIRONMENTAL DEVELOPMENT PLAN FOR BUILDINGS AND COMMUNITY SYSTEMS, 1977
J. Hock, J. Duane, G. Hagey, and D. Moses Mar. 1978 193 p refs
(DOE/EDP-0020) Avail: NTIS HC A09/MF A01

Environmental concerns which include ecological, social/economic, health, safety, and resource impacts associated with the research, development, and demonstration of buildings and community energy systems are identified. An environmental research and development strategy for resolving the concerns is presented. The process provides a framework for: incorporating environmental considerations into agency planning processes at the earliest stages; resolving environmental concerns concurrently with energy technology development; and assuring that adverse environmental effects are mitigated through sound technological design and are at the same level of importance as technological, economic, and institutional issues in decision making. Technology thrusts covered are: architectural and engineering systems; comsumer products and technology; urban waste technology; and community systems. ERA

N78-33623# Los Alamos Scientific Lab., N. Mex.
ADVANCES IN ALPHA AIR MONITORING INSTRUMENTATION
Allen M. Valentine 1978 13 p refs Presented at the Symp. on Advan. in Radiation Project. Monit., Stockholm, 26 Jun. 1978
(Contract W-7405-eng-36)
(LA-UR-78-1150; Conf-780612-1) Avail: NTIS HC A02/MF A01

Improvements made in the early detection of airborne radioactive material are described. An improved alpha air monitoring instrument capable of monitoring select plutonium radionuclides of concern was developed and marketed by nuclear instrumentation companies in the United States during the late 1960's and early 1970's. This monitoring instrument utilized a solid state silicon-diffused junction type detector and a pulse height analyzer system to achieve a radon daughter rejection capability. This rejection capability resulted in an improved sensitivity for specific alpha emitting radionuclides. Later models of this instrument are capable of detecting 40 dis/min of plutonium alpha activity. This activity is about equal to the integrated activity workers would be exposed to if they worked for eight hours in an airborne concentration equal to the maximum permissible concentration for transportable plutonium 239. ERA

N78-33624# California Univ., Livermore. Lawrence Livermore Lab.
ATMOSPHERIC AND GEOPHYSICAL SCIENCES DIVISION, PHYSICS DEPARTMENT PROGRAM REPORT, FY 1977
J. B. Knox, ed. and R. C. Orphan, ed. Dec. 1977 89 p refs
(Contract W-7405-eng-48)
(UCRL-51444-77) Avail: NTIS HC A05/MF A01

Progress is reported on the development of a number of mathematical models for the simulation and computer analysis of a variety of environmental conditions. Regional, local, and global models for the environmental transport of chemicals and radioactive effluents at surface and stratospheric levels are described. ERA

N78-33625# Los Alamos Scientific Lab., N. Mex.
COMPUTER SIMULATION OF THE VISUAL EFFECTS OF SMOKE PLUMES
Michael D. Williams (John Muir Inst.), Mona J. Wecksung, and Ellen M. Leonard 1978 8 p refs Presented at the Soc. of Photo-Opt. Instrumentation Engr. Tech. Symp., Washington, D. C., 28-31 Mar. 1978
(Contract W-7405-eng-36)
(LA-UR-78-689; Conf-780324-2) Avail: NTIS HC A02/MF A01

A technique was developed to modify a clean before scene as dictated by solutions to the radiation transfer problem in a polluted atmosphere. This allows production of computer simulated after scenes, which illustrate the visual effects of pollutants emitted under a variety of circumstances. Application of this technique to very large coal-fired power plants suggests that such facilities may impair scenic vistas under some circumstances, unless stricter pollution controls and standards are enforced. ERA

N78-33626# Department of Energy, Washington, D. C. Div. of Biomedical and Environmental Research.
MAP3S: STUDYING THE TRANSPORT, TRANSFORMATION, AND FATE OF ATMOSPHERIC ENERGY-RELATED POLLUTANTS
Michael C. MacCracken Oct. 1977 71 p refs
(DOE/EV-0008/1) Avail: NTIS HC A04/MF A01

Numerical models were developed to accurately simulate the the atmospheric transformation of atmospheric energy related pollutants for use in assessing the various strategies for generating power. Programs aimed at gaining a better understanding of the role of fossil fuel combustion in affecting the atmosphere are discussed. These discussions include measurements of chemical and meteorological variables that determine the distribution of pollutant species from fossil-fuel electric power production; atmospheric research experiments necessary to understand the mechanisms and related processes that must be included in simulation models; and the capability to simulate the atmospheric behavior, pollutant concentrations, and precipitation chemistry effects of emissions from fossil-fuel power plants that are relevant to human health and welfare. ERA

N78-33627# Environmental Sciences Research Lab., Research Triangle Park, N.C.
USER'S GUIDE FOR PAL A GUASSIAN-PLUME ALGORITHM FOR POINT, AREA, AND LINE SOURCES
William B. Petersen Feb. 1978 163 p refs
(PB-281306/1; EPA-600/4-78-013) Avail: NTIS HC A08/MF A01 CSCL 04A

PAL is a method of estimating short-term dispersion using Gaussian-plume steady-state assumptions. The algorithm can be used for estimating concentrations of non-reactive pollutants at 30 receptors for averaging times of from 1 to 24 hours, and for a limited number of point, area, and line sources (30 of each type). Calculations are performed for each hour. The hourly meteorological data required are wind direction, wind speed, stability class, and mixing height. Single values of each of these four parameters are assumed representative for the area modeled. This algorithm is not intended for application to entire urban

areas but is intended rather, to assess the impact on air quality, on scales of tens to hundreds of meters, of portions of urban areas such as shopping centers, large parking areas, and airports. Level terrain is assumed. GRA

N78-33628# Energy Research and Development Administration, Bartlesville, Okla. Energy Research Center.
EFFECTS OF CATALYTIC REACTORS ON DIESEL EXHAUST COMPOSITION Technical Progress Report
W. F. Marshall, D. E. Seizinger, and R. W. Freedman Apr. 1978 14 p refs
(Contract DI-BM-J-166023)
(PB-281083/6; BM-TPR-105) Avail: NTIS HC A02/MF A01 CSCL 07D

Tests conducted with four different catalytic reactor designs to determine the influence of exhaust treatment systems on emissions from diesel engines are discussed. Although there are significant differences in oxidation efficiencies at light to intermediate engine loads, all four catalysts were very effective in reducing emissions at heavy loads. Compositional determinations included carbon monoxide, carbon dioxide, unburned hydrocarbons, oxides of nitrogen, aldehydes, sulfur dioxide, sulfates, and particulate loading. Particulate size, exhaust odor intensity, and the character of the unburned hydrocarbon component were also determined. GRA

N78-33629# National Bureau of Standards, Washington, D. C.
SURVEY OF THE OCCURRENCE OF MERCURY, LEAD, AND CADMIUM IN THE WASHINGTON, D. C. AREA Final Report, May 1976 - Jul. 1977
E. P. Scheide, J. J. Fillibe, and J. K. Taylor Sep. 1977 96 p Sponsored by ERA, Wash., D.C.
(PB-281725/2; NBSIR-78-1428) Avail: NTIS HC A05/MF A01 CSCL 07D

A plan to comprehensively survey the occurrence of potentially toxic substances in a defined geographical area and its application to the determination of the concentration levels of mercury, lead, and cadmium in various aspects of the environment in the Washington, D.C. area is presented. It describes the basic philosophy of such a survey, the development of a sampling plan, and the identification of analytical methods adequate to obtain the required measurements. Methods of data reduction using the NBS computer are also described. The data are presented in tables and unique computer-generated plots which show the overall concentration profiles and spots of elevated concentration levels. GRA

N78-33630# Battelle Columbus Labs., Ohio.
SAMPLING AND ANALYTICAL METHODOLOGY FOR ATMOSPHERIC PARTICULATE NITRATES Final Report, 11 Jun. 1975 - 10 Dec. 1977
Chester W. Spicer, Philip M. Schumacher, John A. Kouyoumjian, and Darrell W. Joseph Apr. 1978 125 p refs
(Contract EPA-68-02-2213)
(PB-281933/2; EPA-600/2-78-067) Avail: NTIS HC A06/MF A01 CSCL 07D

Environmental conditions that affect atmospheric particulate nitrate sampling were identified, and improved sampling and analytical procedures were developed. Evaluation of potential sources for error in high volume nitrate sampling showed that artifact nitrate formation on commonly used glass filter media was the most serious. Both laboratory and field results demon strated that high purity quartz filters provide a significant improvement over glass filters and are easily substituted for glass filters in tradiational high vlume sampling equipment. A sensitive accurate and rapid nitrate analytical procedure was developed using thermal decomposition of nitrate and chemiluminescent detection of the decomposition products. Ion chromatography was also investigated and found to be sensitive, accurate, reproducible and rapid. Ion chromatography has the added advantage of determining both nitrate and sulfate simultaneously. GRA

N78-33631# Factory Mutual Research Corp., Norwood, Mass.
HAZARDOUS MATERIAL SPILLS: A DOCUMENTATION AND ANALYSIS OF HISTORICAL DATA Final Report, 1971 - Jul. 1973
Joseph L. Buckley and Stephen A. Wiener Apr. 1978 246 p refs
(Contract EPA-68-03-0317)
(PB-281090/1; FMRC-22405; RC76-T-47; EPA-600/2-78-066) Avail: NTIS HC A11/MF A01 CSCL 13B

In excess of 15,000 spill incidents were examined, resulting in the documentation of approximately 10 percent as hazardous material spills. To allow comparison of spills of different materials, a hazard potential scheme was developed, incorporating toxicity and quantity spilled, to rank an incident on a hazard potential scale ranging from one to ten. Primary and secondary causes of hazardous material spills in various operational areas (In transit, loading-unloading areas, in plant storage, in plant processing) were identified. The data were treated to find the frequency and distribiton of hazardous material spills by cause, operational area, and hazard potential. GRA

N78-33632# California State Air Resources Board, Sacramento.
CALIFORNIA AIR POLLUTION CONTROL LAWS
1977 122 p
(PB-281786/4) Avail: NTIS HC A06/MF A01 CSCL 13B

The health and safety code of California for divisions 26 and 27 is presented. Topics include general provisions and definitions, State Air Resources Board, air pollution control districts, nonvehicular air pollution control, and vehicular air pollution control. The pollution control financing authority act, pollution control device certification, motor vehicle inspection program, vehicle registration, and regulations of off-highway vehicles. GRA

N78-33633# Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
NITRATE AND PHOSPHORUS RUNOFF LOSSES FROM SMALL WATERSHEDS IN GREAT LAKES BASIN Final Report, 1 Apr. 1974 - 30 Mar. 1976
B. G. Ellis, A. E. Erickson, and A. R. Wolcott Mar. 1978 95 p ref
(Grant EPA-R-802974-01-0)
(PB-281275/8; EPA-600/3-78-028) Avail: NTIS HC A05/MF A01 CSCL 13B

Summary data are given for nitrogen and phosphorus lost during runoff events during a 2 year study of two small watersheds in the Great Lakes Basin. Patterns of runoff and sedimentation observed on the two watersheds are described in relation to weather conditions at different seasons of the year. Data are presented for ammonium, nitrate, and total nitrogen in the water phase and for ammonium and total nitrogen in the sediment phase. Soluble orthophosphate and total phosphorus concentrations in the water phase and available and total phosphorus in the sediment phase are given. Analysis of soil cores for nitrate, ammonium, and Kjeldahl nitrogen and available phosphorus are given before and after fertilization and after each major runoff event. Detailed descriptions of soils, topography, instrumentation, operational procedures, and management methods are included. GRA

N78-33634# National Technical Information Service, Springfield, Va.
URBAN NOISE POLLUTION. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1970 - Jul. 1978
Edith Kenton Jul. 1978 155 p Supersedes NTIS/PS-77/0653, NTIS/PS-76/0585, NTIS/PS-75/544 and NTIS/PS-74/106 (NTIS/PS-78/0686/2; NTIS/PS-77/0653; NTIS/PS-76/0585; NTIS/PS-75/544; NTIS/PS-74/106) Avail: NTIS HC $28.00/MF $28.00 CSCL 13B

Aspects of noise in the urban environment are covered. The topics were chosen for their interest to urban planners and include citizen attitudes, transportation noise, and noise abatement techniques. (This updated bibliography contains 152 abstracts, 24 of which are new entries to the previous edition). GRA

N78-33635# Environmental Protection Agency, Washington, D. C.
RAPID TECHNIQUES FOR CALCULATING THE POLLUTION STANDARDS INDEX (PSI)
Lance A. Wallace and Wayne R. Ott Mar. 1978 69 p refs
(PB-282028/0; EPA-600/4-78-002) Avail: NTIS HC A04/MF A01 CSCL 13B

A complete set of original nomograms for calculating the PSI in gravimetric or volumetric units is presented. The nomograms are recommended for use by all state and local air pollution control agencies as a means of determining its PSI rapidly and accurately. Examples of linear and logarithmic graphs for calculating the PSI are also included. Tables for rapidly identifying the critical pollutant on a given day and automatically determining its PSI value to the nearest unit are listed. Tables of precise pollutant concentrations corresponding to consecutive unit values of PSI between 1 and 500 for definitive verification of estimates of PSI obtained from the nomograms or other graphs are presented. Computer programs for creating these or similar tables are included. GRA

N78-33636# Research Triangle Inst., Research Triangle Park, N. C.
SYMPOSIUM PROCEEDINGS: ENVIRONMENTAL ASPECTS OF FUEL CONVERSION TECHNOLOGY, 3 Final Report, Apr. 1977 - Feb. 1978
Franklin A. Ayer and Martin F. Massoglia Apr. 1978 547 p
(Contract EPA-68-02-2612)
(PB-282429/0; EPA-600/7-78-063) Avail: NTIS HC A23/MF A01 CSCL 21D

Environmentally related information on coal conversion technology is reviewed and discussed. Major environmental programs, contaminants in coal, process technology, control technology, process measurements, sampling, analytical information on coal gasification and liquefaction, and product usage are among the areas summarized. Specific topics are: program approach, environmental assessment, and control technology development. S.B.S.

N78-33637# Air Pollution Technology, Inc., San Diego, Calif.
DESIGN CRITERIA FOR ROCKET EXHAUST SCRUBBERS Final Report, Dec. 1975 - Dec. 1977
Harry F. Barbarika and Seymour Calvert Mar. 1978 214 p refs Sponsored in part by AF
(Contract EPA-68-02-2145)
(PB-282255/9; EPA-600/7-78-05) Avail: NTIS HC A10/MF A01 CSCL 13B

Results are given of an engineering study and design of methods for scrubbing the exhaust of static-tested solid rockets. Pollutants of major concern were hydrogen chloride and hydrogen fluoride gases. The best process for removing these gases was found to be a gas-atomized spray scrubber, using the power supplied by the rocket to atomize the scrubbing liquid. Four tests in the 22kN pilot-scale rocket scrubber at the U.S. Air Force Propulsion Laboratory were analyzed to aid in the design. Two types of gas-atomized scrubbers were designed: one was a conventional design similar to a venturi; the other was a low-cost unconventional open type, using neither pressure piping nor a ducted spray chamber. Cost analyses were made for both types of rockets with thrusts between 20kN and 2MN. GRA

N78-33638# Aerospace Corp., El Segundo, Calif. Environment and Energy Conservation Div.
INVENTORY OF COMBUSTION-RELATED EMISSIONS FROM STATIONARY SOURCES Report, Jul. 1974 - Apr. 1978
Vernon E. Kemp and Owen W. Dykema Jun. 1978 388 p refs
(Grant EPA-R-803283)
(PB-282428/2; ATR-78(7613)-1; EPA-600/7-78-100) Avail: NTIS HC A17/MF A01 CSCL 13B

A study is described covering the combustion-related emissions phase of a 3-year program on the analysis of NOx control in stationary sources. The study was aimed at helping to establish priorities for detailed studies of techniques for controlling combustion-related emissions from stationary sources. The inventory includes emissions of NOx, HC, CO, and particulates from stationary sources, not only primarily involving combustion but also where combustion plays a secondary role. During each of the 3 years of the study, emissions were inventoried for selected industries or processes: (1st year) boilers, stationary IC engines, chemical manufacturing, and petroleum refining; (2nd year) primary metals and HC evaporation; (3rd year) secondary metals and mineral and wood products. The report identifies 91-98% of the stationary sources of the four air pollutants. Charge rates, emissions, and uncertainties in all data are projected into the future and are shown for the years 1977 and 1982. GRA

N78-33639# National Technical Information Service, Springfield, Va.
AIRPORT NOISE. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jun. 1978
Guy E. Habercom, Jr. Aug. 1978 253 p Supersedes NTIS/PS-77/0704; NTIS/PS-76/0625; NTIS/PS-75/530 (NTIS/PS-78/0807/4; NTIS/PS-77/0704; NTIS/PS-76/0625; NTIS/PS-75/530) Avail: NTIS HC $28.00/MF $28.00 CSCL 13B

Aircraft created noise, noise intensity, noise exposure, and physiological effects, all in airport environments, are investigated. (This updated bibliography contains 246 abstracts, 27 of which are new entries to the previous edition.) GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N78-33640 Rice Univ., Houston, Tex.
GEOLOGY OF THE NORTHERN SIERRA NEVADA BASEMENT ROCKS, QUINCY-DOWNIEVILLE AREA, CALIFORNIA Ph.D. Thesis
Larry Aven Standlee 1978 221 p
Avail: Univ. Microfilms Order No. 7814804

The basement rocks of the northern Sierra Nevada are a heterogeneous assemblage of eugeosynclinal metasedimentary rocks, characterized by abundant siliceous epiclastic rocks and a lack-of volcanic detritus. Quartz arenite and subarkosic conglomerate were apparently derived from a cratonic/plutonic source terrain located to the west or northwest of the northern Sierra Nevada. Despite multiphase penetrative deformation, the formation is a generally stratigraphically coherent unit that dips steeply eastward and is overlain by Late Devonian volcanic rocks. The presence of undeformed carbonate blocks of probable Early Mesozoic age in a structurally complex melange zone indicates that the major deformation of the basement rocks was probably Permo-Triassic or older. Late tectonic movements have juxtaposed fault blocks containing rocks of contrasting lithologies, metamorphic grades, and structural styles. Dissert. Abstr.

N78-33641 Dartmouth Coll., Hanover, N.H.
THE PETROLOGY OF TWO LATE PLIOCENE BENTONITES AND THE ENCLOSING ROCKS, UPPER SIWALIK SUBGROUP, NORTHERN PUNJAB AND SOUTHWESTERN KASHMIR, PAKISTAN Ph.D. Thesis
Donna Marie Summers 1978 255 p
Avail: Univ. Microfilms Order No. 7815994

The lithology and mineralogy of Upper Siwalik Subgroup (Plio-Pleistocene) bentonites are examined. An extensive review of the literature on the petrology of Siwalik Group rocks is included. Thin bentonite horizons that are easily distinguished from the enclosing rocks as well as from each other are studied in detail. Petrography and mineralogy of their sand-sized fractions indicate that gross variations in color and texture of the bentonites are caused by varying amounts of detrital admixture of quartz and rock fragments. At places where bentonite is feldspar-rich, the modal proportions of sand-sized quartz, alkali feldspar, and plagioclase feldspar indicate a parent ash composition of pheno-quartz andesite. The absence of any mafic minerals other than biotite and the composition of the plagioclase feldspars, however, suggest a more rhyolitic parent composition.
Dissert. Abstr.

N78-33642*# National Aeronautics and Space Administration, Washington, D. C.
OPTICAL CHARACTERISTICS OF THE EARTH'S SURFACE AND ATMOSPHERE FROM THE POINT OF VIEW OF THE REMOTE SENSING OF NATURAL RESOURCES: REVIEW OF THE CONTEMPORARY STATUS OF THE PROBLEM
V. I. Tarnopolskiy Oct. 1978 73 p refs Transl. into ENGLISH

of "Opticheskiye Kharakteristiki Poverkhnosti i Atmosfery Zemli s Tochki Zreniya Distantsionnogo Issledovaniya Prirodnykh Resursov", Rept. Pr-287 Acad. of Sci. USSR, Inst. of Space Res., Moscow, 1976 73 p Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75548; Pr-287) Avail: NTIS HC A04/MF A01 CSCL 04A

Widely used remote probing methods, and especially the multispectral method, for studying the earth from aerospace platforms necessitate the systematization and accumulation of data on the relationships between remote observations and measured parameters and characteristic properties and conditions of phenomena on the earth's surface. Data were presented on the optical characteristics of natural objects which arise during observations of these objects over a wide spectral interval which encompasses solar radiation reflected by the object as well as the object's inherent thermal radiation. The influence of the earth's atmosphere on remote measurements and several problems in simulation and calculation are discussed. B.B.

N78-33643* National Aeronautics and Space Administration, Washington, D. C.
TECTONIC ASYMMETRY OF THE EARTH AND OTHER PLANETS
Yu. M. Pushcharovskiy, V. V. Kozlov, and Ye. D. Sulidi-Kondratyev Oct. 1978 21 p refs Transl. into ENGLISH from Priroda (USSR), no. 3, Mar. 1978 p 32-41 Transl. by Sci. Transl. Serv., Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-75576) Copyright. Avail: NTIS HC A02/MF A01 CSCL 08E

The structures of Earth, Mars, Venus, and the Moon are examined and compared. Global tectonic characteristics are presented for each. A comparison of the tectonics reveals the structural asymetry of these planets and the moon. Tectonic asymmetry information for the group is used to interpret certain aspects of the earth's geological past. S.B.S.

N78-33644*# Arkansas Univ., Fayetteville.
PRELIMINARY GEOLOGIC EVALUATION OF L-BAND RADAR IMAGERY: ARKANSAS TEST SITE Final Report
H. MacDonald and W. P. Waite Nov. 1977 29 p Prepared for JPL
(Contracts NAS7-100; JPL-954697)
(NASA-CR-157761) Avail: NTIS HC A03/MF A01 CSCL 08G

The relatively small angles of incidence (steep depression angles) of the L-band system provide minimal shadowing on terrain back-slopes and considerable foreshortening on terrain fore-slopes which sacrifice much of the topographic enhancement afforded by a more oblique angle of illumination. In addition, the dynamic range of the return from vegetated surfaces is substantially less for the L-band system, and many surface features defined primarily by subtle changes in vegetation are lost. In areas having terrain conditions similar to those of northern Arkansas, and where LANDSAT and shorter wavelength aircraft radar data are available, the value of the JPL L-band imagery as either a complimentary or supplementary geologic data source is not obvious. L.S.

N78-33645*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RADAR OBSERVATIONS OF A VOLCANIC TERRAIN: ASKJA CALDERA, ICELAND
D. L. Evans 1 Oct. 1978 46 p refs
(Contract NAS7-100)
(NASA-CR-157765; JPL-Pub-78-81) Avail: NTIS HC A03/MF A01 CSCL 08F

Surface roughness spectra of nine radar backscatter units in the Askja caldera region of Iceland were predicted from computer-enhanced like- and cross-polarized radar images. A field survey of the caldera was then undertaken to check the accuracy of the preliminary analysis. There was good agreement between predicted surface roughness of backscatter units and surface roughness observed in the field. In some cases, variations in surface roughness could be correlated with previously mapped geologic units. G.G.

N78-33646*# Hughes Aircraft Co., Culver City, Calif. Dept. of Antennas.
GEOSYNCHRONOUS MICROWAVE ATMOSPHERIC SOUNDING RADIOMETER (MASR) ANTENNA FEASIBILITY STUDY. VOLUME 3: ANTENNA FEASIBILITY Final Report
A. T. Villeneuve Jan. 1978 178 p
(Contract NAS5-24087)
(NASA-CR-156825) Avail: NTIS HC A09/MF A01 CSCL 04A

Antenna systems capable of operating with a multichannel microwave radiometer intended for mapping severe storm activity over patches on the surface of the earth 750 km square were compared. These systems included a paraboloidal reflector with an offset focal point feed, and a symmetrical Cassegrain reflector system. Both systems are acceptable from the point of view of beam efficiency, however, from the point of view of maintaining the required positional accuracies and surface tolerances, as well as from the point of view of manufacturability, cost effectiveness, and technical risk, the symmetrical Casegrain was selected as the preferred configuration. Performance characteristics were calculated and a mechanical design study was conducted to provide estimates of the technical risk, costs, and development time required for the construction of such an antenna system. J.M.S.

N78-33647*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DETERMINING CRUSTAL STRAIN RATES WITH A SPACE-BORNE GEODYNAMICS RANGING SYSTEM. 2: STATION COORDINATE ANALYSIS
Steven C. Cohen and Glenn R. Cook Aug. 1978 25 p ref Submitted for publication
(NASA-TM-79627) Avail: NTIS HC A02/MF A01 CSCL 08G

The use of a spaceborne geodynamics ranging system for determining crustal strain rates is analyzed. The use of site coordinates rather than intersite baseline distances for the strain rate determinations is emphasized. After discussing the analytical techniques which are to be employed, numerical results are presented which suggest that the use of site coordinates would result in a 20-70% improvement in the precision of the deduced values of straining. Precision of a few parts in 10 to the 9th power would be achievable with simple geometrics and a decade or two of measurements; precisions of a few parts in 10 to the 8th power would be achievable in a few years. A consideration of possible correlations among the derived target site coordinates leads to the conclusion that, with the proper choice of coordinate systems, the correlations can be made small and non-detrimental to the strain rate determinations. J.M.S.

N78-33648# Geophysical Observatory, Sodankyla (Finland).
A NEW FINNISH IONOSONDE IS-14
Aarne Ranta Finn. Acad. of Sci. and Letters Sep. 1978 12 p (Rept-28) Avail: NTIS HC A02/MF A01

Technical specifications and lock diagrams are presented for an ionosonde designed to replace existing instruments, used in Finland. Components described include the timing unit, the frequency synthesizer, the receiver, the integrator, the transmitter, and the recording equipment. A.R.H.

N78-33649# Geophysical Observatory, Sodankyla (Finland).
THE ONSET OF AN AURORAL ABSORPTION SUBSTORM
Hilkka Banta Aug. 1978 14 p refs
(Rept-24) Avail: NTIS HC A02/MF A01

The features of the breakups of auroral absorption substorms are discussed. In the longitudinal sector where the substorm breaks up, a sharp onset is preceded by weak absorption which intensifies as it moves equatorwards. The maximum value of absorption after the onset depends on the intensification of the equatorwards moving absorption preceding the breakup. It seems that before the onset the weak absorption decreases to a minimum just before the onset. At longitudes near the breakup a sharp onset can be seen without any preceding absorption, or the minimum of the absorption preceding the onset lasts longer. G.G.

N78-33650# Geophysical Observatory, Sodankyla (Finland).
STUDIES OF THE ONSET OF AN AURORAL ABSORPTION SUBSTORM

Aarne Ranta and Hilkka Ranta Sep. 1978 16 p refs
(Rept-26) Avail: NTIS HC A02/MF A01

The breakup of an auroral absorption substorm is discussed using riometer data of the Northern Hemisphere. In the longitudinal sector where the substorm breaks up, a sharp onset is preceded by a weak absorption which intensifies as it moves equatorward. The intensification factor of a weak equatorward moving absorption is considered. G.G.

N78-33651# Geophysical Observatory, Sodankyla (Finland).
SOME PROPERTIES OF HIGH LATITUDE SPORADIC E
Tauno Turunen Sep. 1978 18 p refs
(Rept-29) Avail: NTIS HC A02/MF A01

Ionospheric data indicate that three different sporadic E phenomena occur in the auroral zone. In summertime, midlatitude types of sporadic E are seen. These occur in two waves of sequential sporadic E with the first wave in the morning and the second wave in the evening. The evening wave is stronger than the morning wave. Auroral zone types of sporadic E occur throughout the year in the evening and night time hours. The blanketing frequency of these layers increases at the onset of auroral substorms or even a little before. The maximum is reached rapidly. The decay phase is relatively slow. Auroral particle precipitation, which is related to diffuse auroral illumination, seems to control the blanketing frequency of these layers. Weak diffuse echo from the lower boundary of the E layer is always seen in summer if high gain is used in soundings and noise level is low. The echo, which resembles low type sporadic E echo, never blankets and should not be counted as sporadic E. S.B.S.

N78-33652# Geophysical Observatory, Sodankyla (Finland).
HIGH-LATITUDE IONOSPHERIC STUDIES IN FINLAND
Tauno Turunen Sep. 1978 27 p refs
(Rept-25) Avail: NTIS HC A03/MF A01

Ionospheric riometer data, data from different beacon satellite experiments, and some theoretical work are reported on radiowave propagation in the complicated polar ionosphere. The phenomena in the lower ionosphere, at D- and E-layer heights, was extensively studied and the general long and short-term variations of various parameters were established. Much attention was given to the effects of magnetic activity. G.G.

N78-33653*# Illinois Univ., Urbana. Aeronomy Lab.
THEORETICAL AND EXPERIMENTAL STUDIES OF THE ATMOSPHERIC SODIUM LAYER
E. S. Richter and C. F. Sechrist, Jr. 1 May 1978 263 p refs
(Grants NGR-14-005-181; NSF ATM-77-00933)
(NASA-CR-157770; UILU-ENG-78-2501; ISSN-0568-0581; AR-79) Avail: NTIS HC A12/MF A01 CSCL 04A

Atmospheric atomic sodium was studied with a laser radar system. Photocount data were processed using a digital filter to obtain continuous estimates of the sodium concentration versus altitude. Wave-like structures in the sodium layer were observed, and there was evidence for the presence of a standing wave in the layer. The bottomside of the layer was observed to undulate with a period of about 2 1/2 hours, and the layer was observed to broaden through the night. A meteor ablation-cluster ion theory of sodium was developed. The theory shows good agreement with existing atmospheric observations as well as laboratory measurements of rate constants. S.B.S.

N78-33654*# Atlantic Science Corp., Riverdale, Md.
IONOSPHERIC REFRACTION CORRECTIONS IN THE GTDS FOR SATELLITE-TO-SATELLITE TRACKING DATA Final Report
George Nesterczuk and Jerry K. Kozelsky Jul. 1976 130 p refs
(Contract NAS5-22423)
(NASA-CR-156834; Rept-76-W-117-F) Avail: NTIS HC A07/MF A01 CSCL 04A

In satellite-to-satellite tracking (SST) geographic as well as diurnal ionospheric effects must be contended with, for the line of sight between satellites can cross a day-night interface or lie within the equatorial ionosphere. These various effects were examined and a method of computing ionospheric refraction corrections to range and range rate measurements with sufficient accuracy were devised to be used in orbit determinations. The Bent Ionospheric Model is used for SST refraction corrections. Making use of this model a method of computing corrections through large ionospheric gradients was devised and implemented into the Goddard Trajectory Determination System. The various considerations taken in designing and implementing this SST refraction correction algorithm are reported. G.Y.

N78-33655# National Aviation Facilities Experimental Center, Atlantic City, N. J.
TWO LIGHTNING-FLASH COUNTER SYSTEMS Final Report, Dec. 1975 - 1976
L. William Einbinder, Nicholas Mercado, and Robert C. Greenwood Jul. 1978 43 p refs
(AD-A057369; FAA-NA-77-18; FAA-RD-78-39) Avail: NTIS HC A03/MF A01 CSCL 04/1

The battery operated recording instruments were used to determine local ambient lightning-flash activity and to evaluate the usefulness of these devices to air traffic control. The first device, CIGRE, is an acronym for Conference International des Grande Reseaux Electrique. The second device, RSA-10, is an acronym for Republic of South Africa. Data were collected for about 1 year, and the resultant information indicates that the RSA-10 and the CIGRE lightning-flash counters are effective devices for determining the presence of lightning usually associated with cumulonimbus clouds. G.G.

N78-33656# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
CALCULATION OF ATMOSPHERIC COMPOSITION IN THE HIGH LATITUDE SEPTEMBER STRATOSPHERE
Harold N. Ballard, Jose M. Serna, and Frank P. Hudson May 1978 42 p refs
(AD-A055160; ERADCOM/ASL-TR-0006) Avail: NTIS HC A03/MF A01 CSCL 04/1

Prediction of prenuclear event atmospheric composition in the 10 to 100 km region of the atmosphere is required for initial input to models of nuclear weapons effects. ANMAR (the ASL Numerical Model of Atmospheric Radiation, Composition and Dynamics) was used to generate an atmospheric composition model of the 65 deg N September stratosphere (10 to 50 km). Model results of concentrations for O(3P), O2(1 Delta), O3, NO, NO2, NO3, N2O5, HNO3, N2O, HNO2, O(1D), H2O, OH, H2O2, HO2, CH4, HCHO, and CO are presented as number density and mixing ratios in graphical form. Resultant volume production rates for several important reactions are also presented. The calculations performed by the model are fully time dependent and diurnal; however, only the results for noontime are shown. Comparison of calculated results with some observations shows reasonable agreement. Author (GRA)

N78-33657# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
ABRES PRETEST ATMOSPHERIC MEASUREMENTS
Robert O. Olsen and Bruce W. Kennedy Apr. 1978 42 p refs
(AD-A055285; ERADCOM/ASL-TR-0005) Avail: NTIS HC A03/MF A01 CSCL 04/1

Measurements of atmospheric parameters were obtained by utilizing inflatable falling sphere sensors. A series of these spheres were launched on 4 separate days. The first three series consisted of measurements from paired soundings and the last series consisted of four soundings made over a period of approximately 3 hours. The primary purpose of this study was to examine the spatial and temporal variations in atmospheric density between the altitudes of 60 and 90 km utilizing the operational inflatable falling sphere system and determine if this type of system would be capable of providing atmospheric data in support of reentry missions. Results from these series of soundings indicate that in most cases density variations did not exceed 4%, within periods varying from less than an hour to approximately 3 hours. A portion of the density variation can be ascribed to instrumentation and system errors, which were calculated to be 2% over most of the altitude range. These results indicate that the atmospheric density variation in most cases was no more than 2% during these measurements. However, in the last series of launches, data were obtained which indicated large changes in atmospheric structure occurring at about 85 km. These changes were observed in the density, temperature, and wind measure-

ments and may be the result of an internal atmospheric gravity wave. GRA

N78-33658# Royal Norwegian Council for Scientific and Industrial Research, Kjeller.
STATISTICAL MODELS FOR SEISMIC MAGNITUDE Scientific Report, 1 Oct. 1977 - 30 Sep. 1978
Anders Christoffersson (Uppsala Univ., (Sweden)) Mar. 1978 60 p refs
(Contract F08606-78-C-0005; ARPA Order 2551)
(AD-A056140; NORSAR-SCIENTIFIC-2-77/78; SR-1) Avail: NTIS HC A04/MF A01 CSCL 08/11

In this paper some statistical models in connection with seismic magnitude are presented. Two main situations are treated. The first deals with the estimation of magnitude for an event using a fixed network of stations and taking into account the detection and bias properties of the individual stations. The second treats the problem of estimating seismicity and detection and bias properties of individual stations. The models are applied to analyze the magnitude bias effects for an earthquake aftershock sequence from Japan, as recorded by a hypothetical network of 15 stations. It is found that network magnitudes computed by the conventional averaging technique are considerably biased, and that a maximum likelihood approach using instantaneous noise level estimates for non-detecting stations gives the most consistent magnitude estimates. Finally, the models are applied to evaluate the detection characteristics and associated seismicity as recorded by three VELA arrays (UBO, TFO, WMO).
Author (GRA)

N78-33659# SRI International Corp., Menlo Park, Calif.
ANALYSIS OF STRESS IONOGRAMS Final Report, Nov. 1976 - Oct. 1977
Norman J. F. Chang Dec. 1977 69 p refs
(Contract DNA001-77-C-0013; SRI Proj. 5908)
(AD-A056388; AD-E300271; DNA-4486F) Avail: NTIS HC A04/MF A01 CSCL 04/1

Anomalous radar returns seen on ionograms following ionospheric barium releases are analyzed to determine their origin and their interpretation. Two types of echoes are identified; one type originates from the barium cloud and the other type from layers formed by the descent of barium ions into the E-region. A review is made of sporadic-E literature because some of the explanations of the origin and reflection mechanisms proposed for sporadic-E appear to be applicable to barium echoes. Data from past barium releases were also reviewed to supplement the STRESS data base. The findings indicate that reflection from an overdense layer or target is not the cause of the barium-associated returns. Thus, the maximum frequencies of the returns cannot be interpreted as a maximum plasma frequency. Gradient reflection and scatter from weak or strong irregularities are both plausible mechanisms for both types of echoes. The characteristics of the E-region returns and their likely cause (compression due to wind shear) suggest that these layers are thin with sharp boundaries and a rough underside. Author (GRA)

N78-33660# Scripps Institution of Oceanography, San Diego, Calif. Visibility Lab.
AIRBORNE MEASUREMENTS OF ATMOSPHERIC VOLUME SCATTERING COEFFICIENTS IN NORTHERN EUROPE, FALL 1976 Interim Report
Seibert Q. Duntley, Richard W. Johnson, and Jacqueline I. Gordon Jan. 1978 185 p refs
(Contract F19628-76-C-0004; AF Proj. 7621)
(AD-A057144; SIO-REF-78-3; AFGL-TR-77-0239; SR-8) Avail: NTIS HC A09/MF A01 CSCL 04/2

This report presents daytime atmospheric optical data collected chiefly with airborne instruments during a field expedition to northern Europe in the fall of 1976. Results from 12 flights are presented. The data include the natural irradiance upon horizontal plane surfaces, total volume scattering coefficients, atmospheric beam transmittances. Data for daytime conditions ranging from scattered clouds to completely overcast are presented. Data were measured in four spectral regions, as follows: Three narrow band optical filters with mean wavelengths of 478, 664, and 765 nanometers; and one broad band sensitivity representing a pseudo-photopic response with a mean wavelength of 557 nanometers. Selected meteorological properties, measured concurrently with the radiometric data are also included.
Author (GRA)

N78-33661# Emmanuel Coll., Boston, Mass.
INVESTIGATION OF MICROPULSATION ACTIVITY. 1: MAGAF SYSTEM ADDITIONS. 2: DATA ANALYSIS Report, 1 Jul. 1976 - 31 Oct. 1977
William F. Bellew, Charles J. Centor, and M. Patricia Hagan Dec. 1977 45 p refs
(Contract F19628-76-C-0013)
(AD-A056716; AFGL-TR-77-0275-1/2; SR-2-1/2) Avail: NTIS HC A03/MF A01 CSCL 17/6

Systems Additions to the MAGAF data processing system are described herein. In the area of data analysis, a program written to generate magnetograms from the MAGAF Network data is described and sample magnetograms are shown.
Author (GRA)

N78-33662# Dayton Univ. Research Inst., Ohio.
ANALYSIS OF CONJUNCTIVE ROCKETBORNE INFLATABLE SPHERE AND BEAD THERMISTOR SOUNDINGS
Nicholas A. Engler and Mark Dietenberger May 1978 29 p refs
(Contract DAAD07-76-C-0013; DA Proj. 1L1-62111-AH-71)
(AD-A056943; ERADCOM/ASL-CR-78-0013-1) Avail: NTIS HC A03/MF A01 CSCL 04/2

Forty-nine conjunctive Robin/Datasonde soundings were analyzed to determine the compatibility of the temperatures and densities measured by both systems. The results of this analysis indicate differences between the two systems which at times exceed the expected noise error of either system. These large differences for any given sounding can be due to a variety of causes depending to some extent upon the altitude at which the differences occur. Additional measurements and a different Reynolds number are required to better define the sphere coefficient of drag, eliminating the bias measurement between the two systems. GRA

N78-33663# Massachusetts Univ., Amherst. Astronomy Research Facility.
THEORETICAL STUDY OF BACKGROUND RADIANCE IN UPPER ATMOSPHERE Interim Report
Peter Hansen, Raymond Lauzzana, Hajime Sakai, and John Strong Hanscom AFB, Mass. AFGL Dec. 1977 72 p
(Contract F19628-75-C-0187; AF Proj. 2310)
(AD-A057249; UMASS-ARF-77-304; AFGL-TR-78-0013) Avail: NTIS HC A04/MF A01 CSCL 04/1

The Infrared Background Radiance level in the atmosphere above 60 km is estimated for various sight conditions using the two existing computer codes, the FLASH and the DEGGES. The actual computations were made by using the programs modified from these original codes for improvement of processing efficiency. Author (GRA)

N78-33664# Boston Univ., Mass. Dept. of Astronomy.
BEHAVIOR OF THE IONOSPHERIC F-REGION DURING GEOMAGNETIC STORMS Final Scientific Report, 1 Sep. 1974 - 30 Sep. 1977
Michael Mendillo Mar. 1978 165 p refs
(Contract F19628-75-C-0044)
(AD-A056978; ACBU-Ser-3-No-6; AFGL-TR-78-0092-2) Avail: NTIS HC A08/MF A01 CSCL 04/1

The behavior of the ionospheric F-region during geomagnetic storms is addressed by examining many years of total electron content (TEC) data obtained from a semi-global network of TEC observing sites. An analysis procedure is described which leads to the derivation of average disturbance patterns which capture the characteristic features seen during individual storms. These average storm patterns give percentage deviations from monthly median behavior on a local time basis over a 4-day storm period. Primary emphasis is given to disturbance patterns seen over a latitude network spanning the geomagnetic L-shell range L approx. = 1 1/2 to 5. A clear and recurrent pattern of coupled positive and negative excursions over this latitude range are described on a season by season basis. At lower mid-latitudes (L approx. = 1 1/2 - 2), where the largest net changes in ionospheric plasma contents occur, a longitudinal network is used

to confirm and contrast the effects observed in the context of the latitudinal patterns. GRA

N78-33665# Pacific-Sierra Research Corp., Santa Monica, Calif.
ANALYSIS OF ELECTRON DENSITY-PROFILES IN THE LOWER IONOSPHERE Final Report, 1 Aug. - 30 Nov. 1977
E. C. Field, Jr. and M. Lewinstein Mar. 1978 39 p refs
(Contract F19628-77-C-0231)
(AD-A057254; PSR-801; RADC-TR-78-67) Avail: NTIS HC A03/MF A01 CSCL 20/14

This report addresses two separate aspects of the effects of the lower ionosphere on ELF/VLF/LF propagation. First, full-wave calculations are performed to assess the effect of a ledge of ionization in the 55-km to 65-km altitude range (e.g., C-layer) on long-path propagation. Second, relationships among wave frequency, incidence angle, and refraction heights are derived. Author (GRA)

N78-33666# California Univ., Los Angeles. Dept. of Earth and Space Sciences.
APPLICATION OF INVERSION THEORY TO NEW SATELLITE SYSTEMS FOR DETERMINATION OF THE GRAVITY FIELD Final Report, 1 Jul. 1974 - 31 Dec. 1977
W. M. Kaula, G. Cherubini, N. Burkhard, and D. D. Jackson 31 Jan. 1978 44 p refs
(Contract F19628-75-C-0007)
(AD-A057188; AFGL-TR-78-0073) Avail: NTIS HC A03/MF A01 CSCL 08/5

Inversion theory is applied to artificial satellite systems to determine variations in the gravity field and sea level. The resolution matrix is the principal new tool used to indicate discrimination of parameters. The main conclusion is that features of the gravity field resolvable by satellite-to-satellite tracking will not have a horizontal extent much less than the satellite attitude. Author (GRA)

N78-33667# Watt Engineering Ltd., Cedaredge, Colo.
ON THE NATURE AND DISTRIBUTION OF SOLAR RADIATION
Mar. 1978 265 p
(Contract EX-76-C-01-2552)
(HCP/T2552-01) Avail: NTIS HC A12/MF A01

Radiation from the sun and the effects of the earth's atmosphere on the solar energy available over the U.S. are examined. A model is developed which permits calculation of average values of direct normal insolation, diffuse insolation, and total horizontal (global) insolation. The inputs required are atmospheric moisture, turbidity, and cloud cover or percent sunshine. Insolation maps giving seasonal trends and annual average daily energy density values are presented for the direct normal term, the diffuse horizontal term, and the total horizontal (global) term. Model outputs and observed values are compared. ERA

N78-33668# National Geodetic Survey, Rockville, Md.
TRAV10 HORIZONTAL NETWORK ADJUSTMENT PROGRAM
Charles R. Schwartz Apr. 1978 59 p refs
(PB-283087/5; NOAA-TM-NOS-NGS-12; NOAA-78051505) Avail: NTIS HC A04/MF A01 CSCL 08E

TRAV10 performs a two-dimensional adjustment on the ellipsoid. Many features are similar to those of other programs used by other agencies. The handling of the normal equations, especially for large networks, is the most important design criterion. The TRAV10 program uses the Cholesky solution method with a variable band storage scheme. The normal equations are partitioned into variable sized blocks, stored on random access secondary storage, and paged into main memory as needed. A reordering of the unknowns is used to reduce both the required storage and the number of arithmetic operations. GRA

N78-33669# Geological Survey, Reston, Va. Eastern Mineral Resources Branch.
TABLE OF FIELD NUMBERS, LOCALITIES, AND DESCRIPTIONS OF SOURCE MATERIALS FOR MONAZITE-BEARING CONCENTRATES FROM THE SOUTHEASTERN ATLANTIC STATES
John B. Mertie, Jr. 1977 34 p
(PB-281684/1; USGS/GD-78/009) Avail: NTIS HC A03/MF A01 CSCL 08G

Field numbers, geographic localities, and source materials are listed for 246 monazite-bearing panned concentrates from the saprolite of granitic rocks in Virginia, North Carolina, South Carolina, Georgia, and Alabama. These concentrates were studied mineralogically, and the results of the study, published elsewhere, defined three belts of monazite-bearing rocks with an aggregate length of 1400 miles in the southeastern states. The rocks in these belts are the sources from which detrital monazite was eroded to form fluvial and beach placers in the region. GRA

N78-33670# SRI International Corp., Menlo Park, Calif.
ACOUSTIC SOUNDER ARRAY FOR APPLICATION TO AIR POLLUTION. VOLUME 1: EXECUTIVE SUMMARY AND USER GUIDE Final Report
Phillip B. Russell and Edward E. Uthe Feb. 1978 109 p
(Grant NSF AEN-73-02918-A01)
(PB-282064/5; NSF/RA-780031) Avail: NTIS HC A06/MF A01 CSCL 04A

A three year study was conducted to demonstrate the applicability of sodar (acoustic radar) techniques to San Francisco Bay area air pollution problems. A representative, smog-season data set on mixing depth and stability patterns, in a format that can easily be used by numerical air quality models was produced. Extensive comparisons between mixing depths inferred from sodar and from other techniques (balloon, airplane, tower, lidar) demonstrate that, on average in the Bay Area, sodar performs as well as any other single technique for indicating mixing depth. Filming and digitizing techniques were developed to reduce the large data set acquired in the final year to hourly mixing depth and stability indicators. Time-dependent mixing depth and stability maps derived from these data show a readily comprehensible picture of the marked spatial and temporal variations in Bay Area boundary layer behavior. Two case studies demonstrate the use of the sodar data in connection with air pollution incidents. GRA

N78-33671# SRI International Corp., Menlo Park, Calif.
ACOUSTIC SOUNDER ARRAY FOR APPLICATION TO AIR POLLUTION. VOLUME 2: CASE STUDIES AND OTHER APPENDICES Final Report
Phillip B. Russell, Edward E. Uthe, and Francis L. Ludwig Feb. 1978 125 p refs
(Grant NSF AEN-73-02918-A01)
(PB-282065/2; NSF/RA-780032) Avail: NTIS HC A06/MF A01 CSCL 04A

Data presented are: (1) acoustic and direct measurements of atmospheric mixing at three sites during an air pollution incident; (2) sodar network measurements of regional mixing depth and stability patterns for an air quality model; (3) regional patterns of mixing depth and stability; (4) sodar network measurements for input to air quality models; and (5) time-dependent maps of mixing depth and their relation to surface oxidant concentrations. GRA

N78-33672# Wapora, Inc., Washington, D. C.
SURVEY OF ENVIRONMENTAL REGULATIONS APPLYING TO GEOTHERMAL EXPLORATION, DEVELOPMENT, AND USE Final Report
Gene V. Beeland Feb. 1978 257 p refs
(Contract EPA-68-03-2371)
(PB-281023/2; EPA-600/7-78-014) Avail: NTIS HC A12/MF A01 CSCL 10A

Federal, State, and local environmental laws and regulations that apply to geothermal energy development are summarized. Most attention is given to those regulations which deal with air pollution, water pollution, solid wastes and impact assessments. Analyses are made of the regulations with respect to resource definition, pollutants currently not controlled, duplicity and overlap in permit and impact assessment requirements, the lack of uniformity of regulations between states, and the probable future approaches to the regulatory problems. GRA

N78-34033# Joint Publications Research Service, Arlington, Va.
PULSATIONS AND EXPANSION OF THE EARTH: A

POSSIBLE KEY TO AN UNDERSTANDING OF ITS TECTONIC DEVELOPMENT AND VOLCANISM IN THE PHANEROZOIC
Ye. Ye. Milanovskiy *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 33-52 refs Transl. into ENGLISH from Priroda (Moscow), no. 7, Jul. 1978 p 22-34 (For primary document see N78-34028 24-99)
Copyright. Avail: NTIS HC A04/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N78-33673 Michigan Univ., Ann Arbor.
AN ANALYSIS OF THE KINETIC ENERGY OF TWO EXTRATROPICAL CYCLONES Ph.D. Thesis
Jordan Charles Alpert 1978 178 p
Avail: Univ. Microfilms Order No. 78-13607

The behavior of the cyclones was found to be opposite. The primary cyclone developed in a region of small baroclinicity with horizontal import as the major energy source. The secondary cyclone developed on the trailing cold front of the primary cyclone in a region that was highly baroclinic and received kinetic energy as a result of internal conversion. In addition to analysis of the total kinetic energy budget, decomposition of the kinetic energy budget into vertical mean and vertical shear components was accomplished to respectively reveal the relative contributions from barotropic and baroclinic energy sources. The results of the energetic decomposition for the two cyclones are given.
Dissert. Abstr.

N78-33674 Washington Univ., Seattle.
THE ESTIMATION OF AIR CONCENTRATIONS DUE TO THE DIFFUSION, DEPOSITION AND RESUSPENSION OF CONTAMINANTS BY THE WIND Ph.D. Thesis
Thomas William Horst 1977 146 p
Avail: Univ. Microfilms Order No. 7814445

A model for the prediction of the air concentration of a pollutant in the presence of a vertical flux of the material at the surface was developed. The surface flux model integrates over the horizontal extent of the surface source/sink, assuming that the atmospheric diffusion from each differential increment of area is equal to that from a surface point source. Specific processes considered in specifying the areal source strength were a negative vertical flux due to dry deposition, and a positive vertical flux due to the suspension of surface contamination by the wind. The deposition flux is assumed to be equal to the product of the near-surface air concentration and a deposition velocity and the suspension flux to the product of the surface contamination and a resuspension rate. Dissert. Abstr.

N78-33675 Washington Univ., Seattle.
A LARGE SCALE OCEAN-ATMOSPHERE INTERACTION MODEL Ph.D. Thesis
Ka-Ming William Lau 1977 235 p
Avail: Univ. Microfilms Order No. 7814460

A time-dependent statistical-dynamical climate model was developed to study the interactions in the earth-ocean-atmosphere system in a time scale ranging from seasonal to inter-annual. The general three-dimensional structure of the model was simplified into a number of domains which were chosen to isolate regions of similar physics or similar lower boundary conditions. A simplified sea-ice formation process is also included to complete the interaction between the land, ocean and ice components of the climate system. Results of an annual cycle experiment using the dry version of the model show the vast difference in the time scale and amplitude of the response between land and ocean domains. Features of the atmospheric circulation such as the Hadley cell, the Ferrel cells, eddy transports, tropical easterly jets and monsoon transitions are well simulated. Dissert. Abstr.

N78-33676# Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.
RAIN SCAVENGING STUDIES Progress Report
A. Nelson Dingle Jul. 1977 83 p refs
(Contract AT(1171)-1407)
(COO-1407-65; Rept-068670-15-P; PR-13) Avail: NTIS HC A05/MF A01

The emission, transport, and deposition of key contaminants from coal burning were studied. A numerical mesoscale dynamic model capable of simulating atmospheric motions and precipitation patterns in the Lake Michigan Basin region was developed. A numerical model of cloud microphysics and rain generation in the presence of reactive substances was also derived. A quantitative evaluation of the chemical transformations, the transport, and the removal of atmospheric contaminants is presented. S.B.S.

N78-33677# North American Weather Consultants, Goleta, Calif.
INITIAL DEVELOPMENT OF A TACTICAL SYSTEM FOR DISPERSING SUPERCOOLED STRATUS Final Report, Sep. 1976 - Jan. 1978
Chester Wisner, John R. Thompson, and Don A. Griffith 27 Jan. 1978 127 p refs
(Contract F19628-76-C-0306)
(AD-A056570; AFGL-TR-78-0025; Rept-78-20) Avail: NTIS HC A07/MF A01 CSCL 04/2

A silver iodide pyrotechnic seeding system was selected for the development of a tactically useful approach to the dispersal of supercooled stratus. Various configurations of the pyrotechnic units were tested for nucleation effectiveness before choosing a 3/4-in diameter unit doped with a small amount of chlorine-bearing compound. The system was field tested in northern Michigan in February of 1977. The tests showed the system capable of producing clearings comparable to those of previous studies using dry ice as a seeding agent. Clearings were produced in clouds as warm as -8 C and as thick as 4000 feet. Targeting the clearings over a predetermined ground location was not especially difficult. While VFR flight conditions and good downward visibility were achieved, visibility on a slanted line-of-sight was poor. Author (GRA)

N78-33678# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
APPLICATIONS OF POLARIZATION-DIVERSITY RADAR AND LIDAR IN METEOROLOGY Final Report, 4 Nov. 1976 - 30 Sep. 1977
James I. Metcalf and Thomas P. Morton 31 Oct. 1977 68 p refs
(Contract F19628-77-C-0066)
(AD-A056571; AFGL-TR-78-0031) Avail: NTIS HC A04/MF A01 CSCL 04/2

Evaluation of several actual or potential applications of polarization-diversity radar and lidar technology are presented. These include: determination of thermodynamic phase, shape, size, and orientation of hydrometeors; determination of rainfall rate from differential reflectivity measurement; increased unambiguous velocity measurement by polarization coding of Doppler radar pulse pairs; measurement of propagation parameters; and selective suppression of meteorological and non-meteorological echoes. Evaluations include descriptions of demonstrated capabilities and identification of limiting factors associated with equipment design or meteorological parameters. Measurement capabilities and operational benefits of a coherent polarization-diversity radar are discussed. Prospects for the use of lidar in distinguishing high-altitude aerosol layers from clouds are described. Author (GRA)

N78-33679# Weather Wing (5th), Langley AFB, Va.
TAILORED CLIMATOLOGY OF SEVERE WEATHER Final Report
Robert P. Wright Jun. 1978 16 p refs
(AD-A056988; Rept-5WWTN-78-2) Avail: NTIS HC A02/MF A01 CSCL 04/2

This technical note describes the design and use of computer-produced climatologies of severe weather reports within 50 statute miles of a given location. Author (GRA)

N78-33680# Environmental Research and Technology, Inc., Concord, Mass.
DEVELOPMENT OF TECHNIQUES FOR SHORT-RANGE

PRECIPITATION FORECASTS Final Report, 1 Jan. - 30 Sep. 1977
Robert K. Crane Dec. 1977 179 p refs
(Contract F19628-77-C-0058)
(AD-A057153; AFGL-TR-78-0005) Avail: NTIS HC A09/MF A01 CSCL 04/2

Algorithms were developed for the detection and tracking of reflectivity, tangential shear, and Doppler spread cells as detected by a single Doppler weather radar. The previously developed cell detection program was extensively revised to increase speed and reduce computer storage requirements. A new volume cell detection and tracking program was developed to combine the radar data obtained on successive scans to provide a three-dimensional analysis of the radar detected cells and to establish the motion and time histories of the cells. Author (GRA)

N78-33681# Scripps Institution of Oceanography, La Jolla, Calif.
CLIMATE FORECAST VERIFICATION VIA MULTINOMIAL STOCHASTERS
Rudolph W. Preisendorfer Dec. 1977 125 p refs
(Contract N00014-75-C-0152; Grant NSF ATM-75-18699)
(AD-A056920; SIO-REF-77-33) Avail: NTIS HC A06/MF A01 CSCL 04/2

The problem of attaching some quantitative measure of skill to forecasts of temperature, precipitation and other physical fields over extensive regions of the atmosphere and hydrosphere is examined. It is suggested that to each forecaster we may assign a competitive stochaster, a device or person that performs the same forecast over the same regions of space and time as the forecaster, but using a specially designed random procedure. This notion is illustrated for the case of a multinomial stochaster, by means of numerical studies of actual temperature and precipitation forecasts over the U.S. mainland for various seasons over the past three years. Specially designed tables and charts show how quantitative judgments of forecaster skills can be made in a variety of ways. Author (GRA)

N78-33682# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
THE GROWTH AND PREDICTION OF NOCTURNAL INVERSIONS
Frank V. Hansen May 1978 27 p refs
(AD-A056993; ERADCOM/ASL-TR-0008) Avail: NTIS HC A03/MF A01 CSCL 04/2

The growth of nocturnal inversions is investigated with respect to experimental data extracted from the literature. Generally, it was found that the growth of nocturnal inversion with time is in the form Z sub I = 2 sq rt((K sub m)(t)) where K sub m is the eddy viscosity and t is time in minutes, after inversion onset. This investigative effort is applicable to the dispersion and transport of smoke screening and obscurant aerosols and particulates released in nocturnal conditions. GRA

N78-33683# Utah Univ., Salt Lake City. Dept. of Meteorology.
REMOTE SOUNDING OF CLOUD COMPOSITIONS FROM NOAA 4 AND NIMBUS 6 INFRARED SOUNDERS Final Report, 15 Dec. 1974 - 15 Sep. 1977
Kuo-Nan Liou, Robert G. Feddes, Thomas L. Stoffel, and Grant C. AufderHaar 31 Oct. 1977 105 p refs
(Contract F19628-76-C-0107)
(AD-A056852; AFGL-TR-77-0252) Avail: NTIS HC A06/MF A01 CSCL 04/2

A spectral infrared radiative transfer model based on the discrete-ordinate method has been developed for atmospheres containing clouds and absorbing gases above, below and within the cloud. The transfer model takes into consideration the inhomogeneity of the cloudy atmosphere, the gaseous absorption in scattering cloud layers and the wavenumber dependence of radiative transfer. In addition, the cloud layer is further divided into a number of sub-layers to account for the non-isothermal and inhomogeneous cloud characteristics. The spectral infrared transfer program is applied to VTPR channels of the NOAA 4 satellite to simulate upward radiances in cirrus cloud conditions. Single-scattering properties for ice crystals are calculated assuming ice cylinders 200 and 60 micrometers in length and width, respectively, randomly oriented in a horizontal plane. Comparisons between satellite observed and theoretically simulated upward radiances are carried out for selected cirrus cloud cases. Incorporating atmospheric profiles obtained from radiosonde and the observed cloud information into the spectral transfer program, we show a systematic agreement between observed and computed upward radiances. Systematic reduction patterns of the upward radiance caused by the increase of the cloud ice content are demonstrated for VTPR channels employing tropical and midlatitude atmospheric profiles. Having the quantitative relationships between upward radiance and ice contents, procedures are described for the inference of the cloud ice content and cloud amount. The proposed method has been successfully applied to the three cirrus cloud cases. GRA

N78-33684# Nevada Univ. System, Reno. Atmospheric Sciences Center.
AN ASSESSMENT OF SYNOPTIC CRITERIA FOR ICE MULTIPLICATION IN CONVECTIVE CLOUDS Final Report
J. Chang, W. T. Scott, and J. Hallett 20 Mar. 1978 35 p refs
(Grant NSF ENV-76-14519)
(PB-281079/4; NSF/RA-780034) Avail: NTIS HC A03/MF A01 CSCL 04B

A theoretical method was developed to predict the drop spectrum formed by cloud condensation nucleus (CCN) spectrum at a certain level in convective clouds and to assess its role in the ice crystal multiplication process. Hygroscopic particles will grow significantly as relative humidity rises beyond about 70% and form a drop spectrum as they surpass the saturation point. This level was defined as cloud base. Further up in the cloud, subsequent drop growth continued by condensation processes and ultimately coalescence. Condensation was dominant in the initial drop growth process; coalescence could be neglected for drops with diameter less than 20 micrometers. GRA

N78-33685# National Center for Atmospheric Research, Boulder, Colo.
ENERGETICS DIAGNOSIS OF THE NCAR GENERAL CIRCULATION MODEL Ph.D. Thesis
Wayman E. Baker (Missouri Univ.-Columbia) 1978 119 p refs
(Grant NSF ATM-77-23757)
(PB-281140/4; NCAR-CT-48) Avail: NTIS HC A06/MF A01 CSCL 04B

A comprehensive energetics analysis of the NCAR GCM was performed. Two aspects of model performance were investigated: climate simulation and short to medium range, real range, real data forecasting. In the first study, 30-day mean energetic were computed from January and July simulation experiments and compared with observational estimates and with results from other models. The second study examined the daily energetics of real data forecasts in the context of the model approach to quasi-equilibrium climatology. In both studies, the sensitivity of the model energetics to two different convective parameterizations was examined. A qualitative agreement between the observational estimates and the simulation experiments was generally found in the transformation of eddy energies. GRA

N78-33686# SRI International Corp., Menlo Park, Calif.
SPECIFICATION OF CLOUD COVER USING MULTISPECTRAL SATELLITE RADIOMETRIC DATA Final Report, 15 Jan. 1976 - 31 Dec. 1977
P. A. Davis and D. E. Wolf Jan. 1978 86 p refs
(Grant NSF ATM-75-14915)
(PB-281160/2; FR-ERU-4920) Avail: NTIS HC A05/MF A01 CSCL 04B

An automated method for describing cloud cover directly from multispectral satellite measurements was developed. Height, amount, and type (or thickness) information was required. Primary measurement data were selected from the High Resolution Infrared Radiation Sounder (HIRS) of the Nimbus 6 satellite. Cloud truth (learner) data were taken from the Air Force Global Weather Central three dimensional nephanalysis (3DNEPH) archive. The latter data defined what was to be described, and formed the basis for evaluating statistics generated from the measurements. Numerical methods were developed to reclassify 3DNEPH data for each grid element automatically into one of 27 possible cloud classifications. GRA

N78-33687# Saint Louis Univ., Mo. Dept. of Earth and Atmospheric Sciences.
AN INVESTIGATION OF THE BOUNDARY LAYER OF AN AXISYMMETRIC MESOSCALE VORTEX Final Report, Jul. 1975 - Aug. 1977
Gandikota V. Rao and William H. Raymond Aug. 1977 118 p refs
(Grants NOAA-04-6-022-44003; NSF ATM-74-09448-A02)
(PB-282507/3; NOAA-78042003) Avail: NTIS HC A06/MF A01 CSCL 04B

The following topics are discussed: (1) The effect of lower boundary conditions on the boundary layer structure; (2) Boundary layer dynamics of a decaying vortex core; and (3) The investigation of the boundary layer dynamics of a non steady axisymmetric mesoscale vortex. GRA

N78-33688# National Severe Storms Lab., Norman, Okla.
NATIONAL SEVERE STORMS LABORATORY: HISTORY AND FY 1976 PROGRAM
Edwin Kessler Dec. 1977 76 p refs Revised
(PB-282665/9; NOAA-78052302) Avail: NTIS HC A05/MF A01 CSCL 04B

The history and the programs of the National Severe Storms Laboratory (NSSL) through September 1976 are summarized. Objectives organization, biographical sketches, and resources included. The current program exploits the pioneering work done at NSSL in multiple-Doppler radar observation of wind fields in severe thunderstorms. The program uses innovation in Doppler radar to fill meteorological observing requirements and synthesizes Doppler wind field measurements with measurements from special aircraft satellites, and conventional in situ networks to obtain a coherent model of the severe thunderstorm. GRA

N78-33689# National Oceanic and Atmospheric Administration, Washington, D. C. Federal Coordinator for Meteorological Services and Supporting Research.
NATIONAL HURRICANE OPERATIONS PLAN
Richard E. Hallgren May 1978 68 p
(PB-282838/2; FCM-78-2; NOAA-78051601) Avail: NTIS HC A04/MF A01 CSCL 04B

The Hurricane Warning Service is an interdepartmental effort to provide the nation and designated international recipients with environmental data, forecasts, and assessments concerning tropical and subtropical weather systems. Interdepartmental cooperation achieves economy and efficiency in the operation of the Hurricane Warning Service. This plan provides the basis for implementing the agreements of the Department of Commerce, Department of Defense, and the Department of Transportation reached at the annual Interdepartmental Hurricane Warning Conference (combined Atlantic and Pacific). It is the 16th edition of the original, first issued in 1962, and represents a major revision. GRA

N78-33690# National Hurricane and Experimental Meteorology Lab., Coral Gables, Fla.
LOW-LAYER FEATURES OF TWO LIMITED-AREA HURRICANE REGIMES
Michael S. Moss Boulder, Colo. NOAA Mar. 1978 54 p refs
(PB-283079/2; NOAA-TR-ERL-394-NHEML-1;
NOAA-78050302) Avail: NTIS HC A04/MF A01 CSCL 04B

Mean vertical profiles for both Hurricanes Caroline and Eloise show that in the lowest layers, potential temperature and specific humidity varied little with height or not at all. In both storms the lowest layers were capped by a nearly isothermal layer. Detailed turbulence measurements were obtained in Hurricane Eloise from a hot-film anemometer, a gust probe, and a conventional (one sample-per-second) aircraft instrumentation. Momentum spectra from the hot-film anemometer show that the small scales are characterized by inertial subrange behavior. Gust-probe, conventional inertial navigation system, and radar altimeter measurements are used to compute a vertical momentum flux profile. The virtual heat flux profile, determined entirely from conventional measurements, is fairly consistent with that observed in the fair weather trade wind regime. GRA

N78-33691# National Weather Service, Honolulu, Hawaii. Pacific Region.
AN OPERATIONAL MESSAGE COMPOSITION SYSTEM USING THE NWS AUTOMATIC DATA ACQUISITION SYSTEM (ADAS) COMPUTER SYSTEM
G. A. Hirata Apr. 1978 27 p refs
(PB-283088/3; NOAA-NWSTM-PR-18; NOAA-78051501)
Avail: NTIS HC A03/MF A01 CSCL 04B

A simple but effective 'stand-alone' system consisting of: a Beehive Model 3 KCRT; a cassette tape system; and a universal converter was implemented. The system was designed for use by personnel with varying degrees of exposure to computers in general, and KCRTs in particular. The process of accessing, preparation/updating, and transmission of messages is simple and straightforward. It consists of logging on, accessing the format desired, editing the format and transmitting the format to the computer by pressing a single 'enter' key. The computer prefixes and appends all of the necessary teletype function codes required by the different circuits. The completed message, together with all of the necessary teletype function codes, are then automatically transmitted to the converter where it is queued into the converters 5000 character buffer. The converter then transmits the characters onto the teletype paper tape punch where it is punched at approximately 10 characters per second. GRA

N78-33692# Oklahoma Univ., Norman. Dept. of Meteorology.
DYNAMICAL MODEL OF GUST FRONT Final Report
Y. K. Sasaki and Tom Baxter Sep. 1977 43 p refs
(Contract DOT-FA76WAI-622; Grant NOAA-04-6-022-44031)
(PB-283425/7; NOAA-78042004) Avail: NTIS HC A03/MF A01 CSCL 04B

The dynamics of gust fronts generated by Great Plains thunderstorms were considered from the viewpoint of aviation safety. The past and current understanding of the structure and mechanics of gust fronts was thoroughly reviewed and the major problems which are currently obstructing progress were outlined. After a technical discussion of several simulation attempts, it is concluded that a well designed three dimensional simulation is required. GRA

N78-33693*# National Oceanic and Atmospheric Administration, Boulder, Colo. Atmospheric Physics and Chemistry Lab.
FLIGHT DATA OF ELECTRIC FIELD THUNDERSTORM RESEARCH INTERNATIONAL PROJECT, TRIP 76, JULY 1976
Heinz W. Kasemir Jan. 1978 178 p refs Sponsored by NASA
(NASA-CR-15779; PB-282149/4; NOAA-78042703;
NOAA-DR-ERL-APCL-1) Avail: NTIS HC A09/MF A01 CSCL 04B

Graphs of the gradient components (negative electric field components) recorded on three airplanes, at Kennedy Space Center, Florida are presented. GRA

N78-33694# National Technical Information Service, Springfield, Va.
FOG PREDICTION. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jul. 1978
Guy E. Habercom, Jr. Aug. 1978 172 p Supersedes NTIS/PS-77/0799; NTIS/PS-76/0635
(NTIS/PS-78/0775/3; NTIS/PS-77/0799; NTIS/PS-76/0635)
Avail: NTIS HC $28.00/MF $28.00 CSCL 04B

Methods for predicting the possibility of fog formation and forecasting the eventual natural dissipation of fog are investigated. Worldwide climatic conditions conducive to the probability of fog in specific geographic areas are observed. This updated bibliography contains 165 abstracts, 13 of which are new entries to the previous edition. GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N78-33695 New Hampshire Univ., Durham.
ACOUSTIC IDENTIFICATION OF MARINE SEDIMENTS BY STOCHASTIC METHODS Ph.D. Thesis

Halil Tugal 1977 160 p
Avail: Univ. Microfilms Order No. 7813007

The behavior of the quality factor of a viscoelastic compressional wave system was modeled as a lightly damped harmonic oscillator excited by random acoustic inputs in an ocean environment. The first, second, third, and fourth order autocorrelations of the normalized rms of a viscoelastic medium to non-stationary random inputs were determined using Fast Fourier transform technique on the computer. The system with a high quality factor has a flat Gaussian envelope and the system with lower quality factor has a sharper Gaussian envelope function. The temperature effects were included in the medium and the compressional viscous Lame parameter was expressed in terms of a temperature independent and a temperature dependent expressions and other thermodynamical and mechanical variables. The quality factor was expressed as a function of temperature. Data analysis shows that from the core data zones exist and for each zone there is a corresponding acoustical reflector peak in remotely obtained digitized data. Dissert. Abstr.

N78-33686*# National Aeronautics and Space Administration. Wallops Station, Wallops Island, Va.
GEOS-3 OCEAN CURRENT INVESTIGATION USING RADAR ALTIMETER PROFILING Final Report
Clifford D. Leitao, Norden E. Huang, and Carlos G. Parra (EG and G Washington Anal. Serv. Center, Inc., Pocomoke City, Md.) Oct. 1978 32 p refs
(Contract NAS6-2730)
(NASA-TM-73280) Avail: NTIS HC A03/MF A01 CSCL 08C

Both quasi-stationary and dynamic departures from the marine geoid were successfully detected using altitude measurements from the GEOS-3 radar altimeter. The quasi-stationary departures are observed either as elevation changes in single pass profiles across the Gulf Stream or at the crowding of contour lines at the western and northern areas of topographic maps generated using altimeter data spanning one month or longer. Dynamic features such as current meandering and spawned eddies can be monitored by comparing monthly mean maps. Comparison of altimeter inferred eddies with IR detected thermal rings indicates agreement of the two techniques. Estimates of current velocity are made using derived slope estimates in conjunction with the geostrophic equation. A.R.H.

N78-33697# Pacific Northwest Environmental Research Lab., Corvallis, Ore. Marine and Freshwater Ecology Branch.
TECHNIQUES FOR SAMPLING AND ANALYZING THE MARINE MACROBENTHOS
Richard C. Swartz Mar. 1978 37 p refs
(PB-281631/2; EPA-600/3-78-030) Avail: NTIS HC A03/MF A01 CSCL 08A

Guidelines for the quantitative assessment of the effects of marine pollution on benthic community structure and population dynamics are presented. The sampling design addresses the number and location of stations, survey frequency, sampling gear, replication of samples, screening and preservation of biological samples, and the collection of abiotic data. Recommendations are given for the sorting, identification, enumeration, and weighing of benthic specimens. GRA

N78-33698# National Weather Service, Silver Spring, Md. Oceanographic Services Branch.
GULFSTREAM: MONTHLY PUBLICATIONS, JANUARY - DECEMBER 1977. VOLUME 3, NOS. 1 - 12
1977 92 p
(PB-283177/4; NOAA-78051201) Avail: NTIS HC A05/MF A01 CSCL 08C

This publication contains the monthly issues, each having the following information: Gulf Stream position; selected bathythermograms; mean sea surface temperature; surface temperatures; monthly changes; and SST anomalies. The illustrations carry statements elaborating on the data. GRA

N78-33699# Scripps Institution of Oceanography, La Jolla, Calif.
ANNUAL AND SEASONAL MAPS OF THE RESIDUAL TEMPERATURE IN THE UPPER WATERS OF THE WESTERN NORTH PACIFIC FROM 1954 - 1974 Report on the North Pacific Experiment (NORPAX)
Warren B. White and Robert A. Wylie, Jr. Nov. 1977 125 p
Sponsored by NSF
(PB-281212/1; SIO-REF-77-28; NSF/IDOE-78-43) Avail: NTIS HC A06/MF A01 CSCL 08J

Individual seasonal and annual horizontal maps of residual temperature at the sea surface, 100 m, 200 m, and 400 m depth are displayed for the western North Pacific from 2.5 degrees S to 37.5 degrees N, and from 127.5 degrees W. The individual annual maps were constructed from 1954-1974, with the individual seasonal maps constructed from 1964-1974. GRA

N78-33700# National Technical Information Service, Springfield, Va.
GULF STREAM. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jul. 1978
Audrey S. Hundemann Aug. 1978 204 p Supersedes NTIS/PS-77/0719; NTIS/PS-76/0629; NTIS/PS-75/525 (NTIS/PS-78/0844/7; NTIS/PS-77/0719; NTIS/PS-76/0629; NTIS/PS-75/525) Avail: NTIS HC $28.00/MF $28.00 CSCL 08C

Abstracts dealing primarily with the Gulf Stream's currents, salinity, temperature and transport properties are presented. A few abstracts pertain to oceanographic equipment used in the studies. Remote sensing studies are included. This updated bibliography contains 197 abstracts, 35 of which are new entries to the previous edition. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N78-33701 George Washington Univ., Washington, D. C.
THE EFFECTS OF SUPRANORMAL CONCENTRATIONS OF POTASSIUM ION AND OTHER VASOACTIVE DRUGS ON THE VISUAL EVOKED RESPONSE AND REGIONAL CEREBRAL BLOOD FLOW IN THE MONKEY BRAIN Ph.D. Thesis
Billy Gray Bass 1978 150 p
Avail: Univ. Microfilms Order No. 7816549

Common cortical electrodes were used for the measurement of regional cerebral blood flow (rCBF), visual evoked response (VER), and electrocorticogram (EEG) in the occipital cortex of the monkey (Macaca fascicularis). High potassium ion concentration Ringer's lactate, histamine, norepinephrine, and serotonin were perfused at the electrode sites to stimulate changes in rCBF and VER. Significant increases in rCBF and significant reductions in VER amplitude were observed for perfusions of 15 mEq/l and 40 mEq/l concentrations of potassium. Histamine demonstrated both direct and indirect effects on rCBF and VER. Serotonin, topically applied, had no effect on rCBF but reduced VER at 500 micromol concentration. Norepinephrine, topically applied at up to 1 mM concentration had effects similar to those of histamine on rCBF and VER. Dissert. Abstr.

N78-33702*# Boeing Co., Huntsville, Ala.
BIOLOGICAL WATER QUALITY MONITORING USING CHEMILUMINESCENT AND BIOLUMINESCENT TECHNIQUES Final Report
Richard R. Thomas 10 Feb. 1978 23 p
(Contract NAS5-22545)
(NASA-CR-156830) Avail: NTIS HC A02/MF A01 CSCL 06M

Automated chemiluminescence and bioluminescence sensors were developed for the continuous monitoring of microbial levels in water supplies. The optimal chemical procedures were determined for the chemiluminescence system to achieve maximum sensitivity. By using hydrogen peroxide, reaction rate differentiation, ethylene diamine tetraacetic acid (EDTA), and carbon monoxide pretreatments, factors which cause interference were eliminated and specificity of the reaction for living and dead bacteria was greatly increased. By employing existing technology with some modifications, a sensitive and specific bioluminescent system was developed. G.G.

N78-33703*# National Aeronautics and Space Administration, Washington, D. C.

RELATIONSHIP BETWEEN OSMOTIC PRESSURE OF THE BLOOD AND SECRETION OF SWEAT
A. Montuori Oct. 1978 21 p refs Transl. into ENGLISH from Arch. Fisiol. (Italy), v. 9, no. 4, 1904 p 439-452 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Inst. of Biol. Sci., Naples
(Contract NASw-3199)
(NASA-TM-75461) Avail: NTIS HC A02/MF A01 CSCL 06C

Experiments with cats show that the thermic secretion of sweat represents a specific case of a general law: The central nervous apparatus that controls the secretion of sweat begins to function when the osmotic pressure of the blood drops below normal. Author

N78-33704# Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.
X-RAY ANALYSIS OF BIOLOGICAL SPECIMENS
James R. Coleman 1978 15 p refs Presented at the Scanning Electron Microscopy Conf., Los Angeles, 16 Apr. 1978
(Contract EY-76-C-02-3490)
(UR-3490-1341; Conf-780415-2) Avail: NTIS HC A02/MF A01

Electron probe X-ray microanalysis of biological samples involves samples with properties quite different from those usually encountered with geological and metallurgical materials specimens. In order to optimize conditions for analyzing biological samples, it is necessary to take into account the ways in which the biological materials interact with the electron beam and the X-rays generated by the electron beam. Range of electron penetration, beam spreading, X-ray induced X-ray fluorescence, beam current, accelerating voltage, and electron source brightness influence analysis, and the effects of these parameters are examined. The physical density of the sample, its surface characteristics, and mean atomic number also affect analysis and the role of these parameters in analysis are outlined. Types of quantitative analysis are described and appropriate quantitative procedures for each type are presented and analyzed. ERA

N78-33705# Massachusetts Inst. of Tech., Oak Ridge, Tenn. School of Chemical Engineering Practice.
VOLUME-RESTRICTED FREEZING OF LIVING CELLS AND TISSUES
S. D. Engstrom, Y. E. Chu, W. F. Sung, and M. S. Giroux 20 Dec. 1977 28 p refs
(Contract W-7405-eng-26)
(ORNL/MIT-265) Avail: NTIS HC A03/MF A01

The effect of constant-volume freezing on the survival of red blood cells in diluted rabbit blood and of Artemia Salina (brine shrimp) in dimethyl sulfoxide (DMSO)-saline solution was examined. Constant-volume freezing significantly improved red-blood-cell survival, but not brine-shrimp survival, compared with constant-pressure freezing. Cell survival could be further increased by using high surface-area-to-volume vessels, moderate cooling rates, and fast warming rates. Unfrozen Artemia survived for more than 2.5 hr at room temperature in a solution which maintained constant volume during freezing (32.5 vol percent DMSO). Since Artemia also withstood pressures above 10,000 psi and formation of exterior ice, deaths were attributed to the freezing or thawing processes, particularly to the formation of ice within the organisms. ERA

N78-33706# Battelle Pacific Northwest Labs., Richland, Wash.
BIOLOGICAL EFFECTS OF HIGH STRENGTH ELECTRIC FIELDS ON SMALL LABORATORY ANIMALS Annual Report, Apr. 1977 - Mar. 1978
Apr. 1978 213 p
(Contract EY-76-C-06-1830)
(HCP/T1830-03) Avail: NTIS HC A10/MF A01

The biological effects on mice and rats of exposure to 60-Hz electric fields were studied. Results are reported on the effects of 30-day and 60-day exposures to 100 kV/m, 60-Hz electric fields on hematologic values, blood chemistry, and organ weights. With the possible exception of elevated blood platelet counts following 60-day exposures, there were no pathological changes observed in either mice or rats. ERA

N78-33707# National Technical Information Service, Springfield, Va.
CRYOBIOLOGY. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jun. 1978
Jul. 1978 166 p Supersedes NTIS/PS-77/0619; NTIS/PS-76/05-57; NTIS/PS-75/508
(NTIS/PS-78/0678/9; NTIS/PS-77/0619; NTIS/PS-76/0557; NTIS/PS-75/508) Avail: NTIS HC $28.00/MF $28.00 CSCL 06C

Cryogenic blood preservation, cryogenic surgical transplantation, cryopreservatives, cryoprotective agents, cryosurgery, and cryotherapy are the subjects covered by the selected abstracts of research reports. (This updated bibliography contains 160 abstracts, 14 of which are new entries to the previous edition.) GRA

N78-34032# Joint Publications Research Service, Arlington, Va.
BIOLOGICAL EXPERIMENTS ON BOARD SALYUT-6
Aleksandr Kamin *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 26-32 Transl. into ENGLISH from Tekhnika-molodezhi (Moscow), no. 6, 1978 p 12-13 (For primary document see N78-34028 24-99)
Copyright. Avail: NTIS HC A04/MF A01

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N78-33708 Michigan Univ., Ann Arbor.
QUANTITATIVE ORGAN VISUALIZATION Ph.D. Thesis
Louis Theodore Kircos 1978 146 p
Avail: Univ. Microfilms Order No. 78-13683

The use of single photon emission computed tomography (ECT) to perform QOV was evaluated using a scintillation camera transaxial tomograph. The extent of the radioactivity distribution of the organ of interest was defined by the extent of and the edges of the organ of interest were delineated by computing the maximum of the least squares directionally sensitive first derivative of the image. Also, an expression for the absolute activity in the organ was derived in terms of the ECT counts and size, imaging system efficiency, imaging time and attenuation factors. Dissert. Abstr.

N78-33709 Ohio Univ., Athens.
THE EFFORT OF NOISE EXPOSURE ON THE MASKING LEVEL DIFFERENCE Ph.D. Thesis
Stephan Edward Oshrin 1978 82 p
Avail: Univ. Microfilms Order No. 7812002

Pre-exposure masking level differences (MLDs) and binaural thresholds in quiet were recorded for six young adults with normal hearing prior to their being exposed to broad band noise ranging in intensity from 60 SPL to 108 SPL. Following the exposure, post-exposure MLDs were recorded at 1, 3, 5, 10, and 20 minutes after exposure. Additionally, binaural thresholds in quiet were recorded at 2 minutes and 20 minutes after noise exposure. Although there was no significant change in the binaural thresholds in quiet, a significant reduction in the MLD takes place at 1 minute after exposure at all exposure intensities. The decrease in MLD was temporary and brief. The possible causative factors for the decrease in MLD include tinnitus and tonal alterations of the pure tone stimuli caused by the noise exposure. Dissert. Abstr.

N78-33710* National Aeronautics and Space Administration, Washington, D. C.
THE PREVENTIVE ROLE OF ULTRAVIOLET RADIATION DURING EXPOSURE TO IONIZING RADIATION
G. S. Yatsula May 1978 9 p refs Transl. into ENGLISH from Gig. Sanit. (USSR), no. 2, Feb. 1978 p 48-52 Transl. by Sci. Transl. Serv., Santa Barbara, Calif.
(Contract NASw-2791)
(NASA-TM-75106) Copyright. Avail: NTIS HC A02/MF A01 CSCL 06R

The effect of suberythematous doses of ultraviolet and ionizing

radiation on sulfhydryl groups, cholesterol and hemoglobin of the blood is studied. Author

N78-33711 California Inst. of Tech., Pasadena.
HYSTERESIS IN HUMAN BINOCULAR FUSION: A SECOND LOOK Ph.D. Thesis
Daniel Bruce Diner 1978 110 p
Avail: Univ. Microfilms Order No. 78-15970

Using binocular retinally stabilized images, a stimulus regime was designed to determine the size and location of Panum's fusional area at any given stimulus condition. This regime was employed to measure Panum's fusional area in the non-extended and in the extended conditions. The following three results were obtained: (1) The nasalward limits of Panum's fusional area and the hysteresis demonstrated by the nasalward limits do not differ significantly from the temporalward limits; (2) a non-transient stimulus will fuse over a significantly wider range with a transient stimulus than with another non-transient stimulus; and (3) the extension of Panum's fusional area, not only includes the recruitment of retinal locations into Panum's fusional area which are not normally in Panum's fusional area, but also includes the loss from Panum's fusional area of certain retinal locations which are normally within Panum's fusional area. Dissert. Abstr.

N78-33712 Georgia Inst. of Tech., Atlanta.
FAST NEUTRON DEPTH DOSE DISTRIBUTIONS IN A HETEROGENEOUS PHANTOM Ph.D. Thesis
Joseph John Shonka 1978 118 p
Avail: Univ. Microfilms Order No. 7816664

A Monte Carlo code was developed to calculate parameters of interest in the reference man series of phantoms. Results obtained from the code for an A-P exposure of the left lung included the absorbed dose to various organs and the depth dose distribution, neutron spectra, and LET spectra. Experimental measurements were made for four cases: a homogeneous soft tissue phantom and heterogeneous phantoms with soft tissue and lung, soft tissue and skeleton, and soft tissue with lung and skeleton, respectively. These measurements were made in a physical mockup of organs filled with equivalent substitutes for skeleton, lung, and soft tissue. A small tissue-equivalent proportional counter, a tissue-equivalent ionization chamber, and an energy compensated G-M tube were used. From all techniques, total dose, LET, fast neutron dose and gamma dose were derived as a function of depth in the thoracic region. Dissert. Abstr.

N78-33713* National Aeronautics and Space Administration, Washington, D. C.
THE LUMBOSACRAL SEGMENT AS A VULNERABLE REGION IN VARIOUS POSTURES
B. Rosemeyer Oct. 1978 6 p Transl. into ENGLISH from Orthopaed. Praxis (West Germany), v. 13, no. 8, 1977 p 537-539 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Munich Univ.
(Contract NASw-3199)
(NASA-TM-75579) Copyright. Avail: NTIS HC A02/MF A01 CSCL 06P

The lumbosacral region in man is exposed to special static and dynamic load. In a supine position, the disc size increases because of the absence of axial load. In a standing position, with physiological posture of the spine, strain discomfort occurs which is increased even more in the sitting position due to the curvature of the lumbar region of the spine and the irregular distribution of pressure in the discs as a result of this. This special problem of sitting posture can be confirmed by examinations. Author

N78-33714 Wayne State Univ., Detroit, Mich.
THE INTERACTION BETWEEN THE UTRICLES AND THE SEMICIRCULAR CANALS DURING ECCENTRIC ROTATION Ph.D. Thesis
Glenn Douglas Cummings 1978 212 p
Avail: Univ. Microfilms Order No. 78-16016

Human subjects were rotated in a cupulometer (a rotating chair with precisely controlled velocities and accelerations) and their eye movements were recorded electronystagmographically. Habituation was not shown to have a significant effect upon any of the parameters of nystagmus with repeated stimulations. The adaptation model was shown to provide a better fit to the nystagmus data than the torsion pendulum model. The linear acceleration produced by eccentric rotation was shown to indirectly modify the nystagmus induced by angular acceleration. This modification in the nystagmus was effected at the peripheral level, and was manifest as a change in the time constant associated with the dynamics of the semicircular canals. The otoliths of the utricles are stimulated by the linear acceleration; this in turn may stimulate the efferent system to the cupula, affecting the stiffness of the cupula, thus causing the change in time constant of the semicircular canals. Dissert. Abstr.

N78-33715*# National Aeronautics and Space Administration. Pasadena Office, Calif.
OPTICAL PROBE Patent Application
Robert E. Frazer, inventor (to NASA) (JPL) Filed 6 Mar. 1978 11 p Sponsored by NASA
(NASA-Case-NPO-14247-1; US-Patent-Appl-SN-883383) Avail: NTIS HC A02/MF A01 CSCL 06B

A rectal probe which provides a view to the side of the probe end, instead of just a straight ahead view is disclosed. The probe includes a ring-shaped window and a reflective coating on a lens located near the window. The reflective coating directs light passing in through the window, towards the eye piece end of the probe. The probe includes a fiber optic bundle. The reflective coating and lenses focus the light onto the end of the fiber optic bundle. Another set of lenses focuses light from in front of the probe onto the center of the fiber optic bundle. NASA

N78-33716*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TISSUE IDENTIFICATION BY ULTRASOUND
D. H. LeCroissette, R. C. Heyser, P. M. Gammell, and R. L. Wilson (Harbor General Hosp., Los Angeles) 15 Oct. 1978 88 p refs
(Contract NAS7-100)
(NASA-CR-157776; JPL-Pub-78-90) Avail: NTIS HC A05/MF A01 CSCL 06B

The ultrasonic properties of animal and human soft tissue were measured over the frequency range of 1.5 to 10.0 MHz. The method employed a swept-frequency, coherent technique known as time delay spectrometry. Measurements of attenuation versus frequency on liver, backfat, kidney, pancreas, spleen, breast, and other tissue were made. Considerable attention was paid to tissue handling and in determining the effects of fixing on the attenuation of ultrasound in the tissue. G.G.

N78-33717*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MICRO-FLUID EXCHANGE COUPLING APPARATUS Patent Application
John E. Johnson (San Francisco Univ., Calif.) and Paul F. Swartz, inventor (to NASA) Filed 16 Oct. 1978 13 p
(NASA-Case-ARC-11114-1; US-Patent-Appl-SN-951422) Avail: NTIS HC A02/MF A01 CSCL 06B

In a microfluid exchange apparatus for exchanging fluid with an organ, such as the trachea or a blood vessel of a small animal, a syringe needle is provided for penetrating the fluid conduit of the animal. The syringe needle is coupled to a plenum chamber having an inlet and outlet port. The plenum chamber is coupled to the syringe needle via the intermediary of a standard quick disconnect coupling fitting. The plenum chamber is carried at the end of a drive rod which is coupled to a micrometer drive head. The micrometer drive head is slidably and pivotably coupled to a pedestal for adjusting the height and angle of inclination of the needle relative to a reference base support. The needle is positioned adjacent to the incised trachea or a blood vessel of a small animal and the micrometer drive head is operated for penetrating the fluid conduit of the animal. NASA

N78-33718# Tracor Jitco, Inc., Rockville, Md.
FORMATION AND MANAGEMENT OF AN EXPERT TOXICOLOGICAL REVIEW TEAM FOR LITERATURE SEARCH, EVALUATION AND ORGANIZATION OF CURRENTLY AVAILABLE RAPID TOXICOLOGICAL TESTS, VOLUME 1 Final Report, 30 Sep. 1977 - 28 Apr. 1978
Arthur J. Shanahan Apr. 1978 144 p refs
(Contract DAMD17-77-C-7056; DA Proj. 3E1-61102-BS-04)
(AD-A056311) Avail: NTIS HC A07/MF A01 CSCL 06/20

The objective of this study was to determine the feasibility of identifying short-term in vivo or in vitro toxicity tests which could be included in a battery of such tests as part of a toxicological screening program. The study was performed by a panel of ten toxicology experts and a contractor management team, which included scientific information specialists. Six compounds (benzene, cadmium, formaldehyde, phosphorus, phosgene, oxides of nitrogen) were chosen as models for analysis by a matrix format. Each matrix was supported by a review article. Panel members selected predictive endpoints from acute and subchronic data taken from the literature. The panel also recommended short-term tests relevant to the endpoints for each compound. Position papers were developed for: pharmacokinetics; behavioral toxicity; in vitro testing; reproductive assessment testing and a concept for toxicological testing. Bibliographies were prepared for the matrix reviews, each position paper, and one for the overall study. Based on the analyses of the matrices, the position papers and their collective experience, the panel developed recommendations for short-term tests for a minimal toxicology screening program and pointed out gaps wherein additional research was required. Author (GRA)

N78-33719# Tracor Jitco, Inc., Rockville, Md.
FORMATION AND MANAGEMENT OF AN EXPERT TOXICOLOGICAL REVIEW TEAM FOR LITERATURE SEARCH, EVALUATION AND ORGANIZATION OF CURRENTLY AVAILABLE RAPID TOXICOLOGICAL TESTS, VOLUME 2 Final Report, 20 Sep. 1977 - 28 Apr. 1978
Arthur J. Shanahan Apr. 1978 456 p refs
(Contract DAMD17-77-C-7056; DA Proj. 3E1-61102-BS-04)
(AD-A056312) Avail: NTIS HC A20/MF A01 CSCL 06/20

The objective of this study was to determine the feasibility of identifying short-term in vivo and in vitro toxicity tests which could be included in a battery of such tests as part of a toxicological screening program. The study was performed by a panel of ten toxicology experts and a contractor management team, which included scientific information specialists. Six compounds (benzene, cadmium, formaldehyde, phosphorus, phosgene, oxides of nitrogen) were chosen as models for analysis by a matrix format. Each matrix was supported by a review article. Panel members selected predictive endpoints from acute and subchronic data taken from the literature. The panel also recommended short-term tests relevant to the endpoints for each compound. Position papers were developed for: pharmacokinetics; behavioral toxicity; in vitro testing; reproductive assessment testing and a concept for toxicological testing. Bibliographies were prepared for the matrix reviews, each position paper, and one for the overall study. Based on the analyses of the matrices, the position papers and their collective experience, the panel developed recommendations for short-term tests for a minimal toxicology screening program and point out gaps wherein additional research was required. Author (GRA)

N78-33720# Battelle Pacific Northwest Labs., Richland, Wash.
COMPILATION AND ASSESSMENT OF MICROWAVE BIOEFFECTS, A0-02-01/EA81028: A SELECTIVE REVIEW OF THE LITERATURE ON BIOLOGICAL EFFECTS OF MICROWAVES IN RELATION TO THE SATELLITE POWER SYSTEM Final Report
D. R. Justesen, H. A. Ragan, L. E. Rogers, A. W. Guy, D. L. Hjeresen, and W. T. Hinds Mar. 1978 91 p refs
(Contract EY-76-C-06-1830)
(PNL-2634) Avail: NTIS HC A05/MF A01

Literature on the biological effects of microwaves is reviewed with regard to one of the following: (1) cardiovascular responses; (2) cataracts; (3) gonad response; (4) genetics; (5) teratology; and (6) hematology; appendices are included on biophysical aspects of microwave radiation and a glossary of biophysical terms. A bibliography containing more than 100 references is also included. Author (ERA)

N78-33721# Los Alamos Scientific Lab., N. Mex. Health Physics Group.
ADVANCES IN HUMAN INTERNAL RADIATION COUNTING AT LOS ALAMOS: MULTIPLE SIMULTANEOUS IN-VIVO MEASUREMENTS
C. John Umbarger and Leon West 1978 12 p refs Presented at the IAEA Intern. Symp. on Advan. in Radiation Project. Monitoring, Stockholm, 26 Jun. 1978
(Contract W-7405-eng-36)
(LA-UR-78-1063; Conf-780612-2; IAEA-SM-229/65) Avail: NTIS HC A02/MF A01

In order to improve the health physics surveillance program for radiation workers at the Los Alamos Scientific Laboratory (LASL), the In-Vivo Measurements Laboratory at LASL were ungraded to provide four separate, yet simultaneous, photon spectral measurements on a single individual, with each spectrum providing different information. The four spectra are acquired with the following four detectors and respective energy regions: the NaI portion of twin phoswich detectors placed over the chest of the subject and monitoring the 10 to 140 keV photon region the CsI portion of the same phoswich detectors and monitoring the energy region from 200 to 2000 keV a large planar hyperpure germanium detector placed directly over the liver area of the prone subject and monitoring the region 10 to 250 keV and a large volume Ge(Li) detector placed directly under the prone subject and monitoring the region 55 to 2000 keV. ERA

N78-33722# Bonneville Power Administration, Portland, Oreg.
ELECTRICAL AND BIOLOGICAL EFFECTS OF TRANSMISSION LINES: A REVIEW
J. M. Lee, Jr., T. D. Bracken, A. S. Capon, S. H. Sarkinen, G. M. Ihle, D. E. Perry, and T. R. Eyler Jun. 1977 67 p refs Sponsored by DOE
(BPA-BIO-77-1) Avail: NTIS HC A04/MF A01

The electrical effects of ac and dc transmission lines are described and the state-of-the-art knowledge on the possible biological effects of such lines is reviewed. Electrical effects are defined as those resulting from electric and magnetic fields, and corona. The fields can induce currents and voltages in plants and animals. Corona produced audible noise, electromagnetic interference, and small amounts of oxidants (e.g. ozone). The possible biologic effects of these electrical parameters, and practices used to mitigate adverse effects, are described. Field effects on cardiac pacemakers, fences, irrigation equipment, and flammable materials are considered. ERA

N78-33723# Maryland Univ., Baltimore. Div. of Pulmonary Diseases.
EFFECTS OF NITROGEN DIOXIDE ON PULMONARY FUNCTION IN HUMAN SUBJECTS
David H. Kerr Apr. 1978 31 p refs Prepared in cooperation with Johns Hopkins Univ., Baltimore, Md.
(Contract EPA-68-02-1745)
(PB-281186/7) Avail: NTIS HC A03/MF A01 CSCL 06T

Subjects with asthma and were exposed to 0.5 ppm of nitrogen dioxide (NO2) for two hours in an environmental chamber. They engaged in one 15-minute, light to medium-exercise stint on a bicycle ergometer during this period. The subjects with asthma experienced the greatest symptoms with exposure to No2, i.e., seven of thirteen noting slight burning of the eyes, slight headache, and chest tightness or labored breathing with exercise. One each of the subjects with chronic bronchitis experienced slight nasal discharge. Significant changes from control values for the group as a whole with exposure to NO2 were observed for some pulmonary function tests. GRA

N78-33724# National Technical Information Service, Springfield, Va.
HYPERBARIC OXYGENATION. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jun. 1978
Elizabeth A. Harrison Jul. 1978 164 p Supersedes NTIS/PS-77/0600; NTIS/PS-76/0526; NTIS/PS-75/236
(NTIS/PS-78/0676/3; NTIS/PS-77/0600; NTIS/PS-76/0526; NTIS/PS-75/236) Avail: NTIS HC $28.00/MF $28.00 CSCL 06S

Research reports discussing microbiology, respiratory infections, oxygen toxicity, diving, decompression sickness and metabolism as applied to hyperbaric oxygenation are covered in the citations. (This updated bibliography contains 157 abstracts, 4 of which are new entries to the previous edition.) GRA

N78-33725# Bureau of Radiological Health, Rockville, Md. Div. of Biological Effects.
PHYSICAL MECHANISMS FOR BIOLOGICAL EFFECTS OF ULTRASOUND

Wesley L. Nyborg Sep. 1977 70 p refs Sponsored in part by Catholic Univ. of America and HEW
(PB-282234/4; FDA/BRH-78/99; DHEW/PUB/FDA-78/8062) Avail: NTIS HC A04/MF A01 CSCL 06R

Physical mechanisms are reviewed by which ultrasound produces changes in living systems. When ultrasound is applied to aqueous suspensions of macromolecules or cells, and heat avoided, enzymes may be inactivated or cells modified; the mechanism is usually sonic cavitation. Mechanisms identified when heat is ruled out are radiation force, radiation torque, and acoustic microstreaming. Lowest intensity levels are compared at which effects on mammalian tissues were reported, with current medical diagnostic levels. GRA

N78-33726# National Technical Information Service, Springfield, Va.

ANTHROPOMETRY: BASIC STUDIES AND APPLICATIONS, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1976 - Jul. 1978

Carolyn Shonyo Aug. 1978 80 p Supersedes NTIS/PS-77/0757; NTIS/PS-76/0679; NTIS/PS-75/629
(NTIS/PS-78/0866/0; NTIS/PS-77/0757; NTIS/PS-76/0679; NTIS/PS-75/629) Avail: NTIS HC $28.00/MF $28.00 CSCL 06N

Research studies are abstracted relative to anthropometric measurements for use in designing military and civilian protective equipment and clothing, automobile interiors and air bag restraint systems, aircraft cabins, and aircraft seats. Reports on the design of anatomical models, computerized simulation of the human body, and anthropometry as related to the strength of body members and physical fitness are included. This updated bibliography contains 73 abstracts. GRA

N78-33727# Joint Publications Research Service, Arlington, Va.

TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY: BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 45: EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION

22 Sep. 1978 43 p refs Transl. into ENGLISH from various Russian journals
(JPRS-71910) Copyright. Avail: NTIS HC A03/MF A01

Cellular and molecular effects of microwave electromagnetic fields on biological systems was investigated. The effects of millimeter radio waves on bio systems were also reviewed, along with the combined effect of SHF fields and high temperatures on the human body. For individual titles, see N78-33728 through N78-33730.

N78-33728# Joint Publications Research Service, Arlington, Va.

CELLULAR AND MOLECULAR EFFECTS AND THE MECHANISM OF ACTION OF MICROWAVE ELECTROMAGNETIC FIELDS ON BIOLOGICAL SYSTEMS

S. L. Arber *In its* Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci., No. 45 (JPRS-71910) 22 Sep. 1978 p 1-16 refs Transl. into ENGLISH from Elektron. Obrab. Materialov (Moscow), no. 3, 1978 p 59-65 (For primary document see N78-33727 24-52)
Copyright. Avail: NTIS HC A03/MF A01

Effects and mechanisms at the cellular, subcellular, and molecular levels were investigated. The electromagnetic field effects on cells were classified into two groups with the following characteristics: (1) particular orientation, alignment into a chain, or directed movement of unicellular animals; and (2) change in physiological functions. Conditions necessary for observation of biological effects of microwave are enumerated. J.A.M.

N78-33729# Joint Publications Research Service, Arlington, Va.

BIOMEDICAL EFFECTS OF MILLIMETER RADIO WAVES

I. S. Cherkasov, V. A. Nedzvetskiy, A. V. Gilenko, and N. I. Pirogov *In its* Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci., No. 45 (JPRS-71910) 22 Sep. 1978 p 21-27 refs Transl. into ENGLISH from Oftalmol. Zh. (Odessa), no. 3, 1978 p 187-190 (For primary document see N78-33727 24-52)
Copyright. Avail: NTIS HC A03/MF A01

A comparative study of total planar preparations of the corneas of control and experimental animals did not reveal abnormal deviations in the morphological structure after exposure to millimeter waves. Computation results revealed differences in the mitotic activity of the epithelium of irradiated, nonirradiated, and control corneas. An exposure time of ten minutes caused an increase in the quantity of dividing cells in the irradiated cornea. J.A.M.

N78-33730# Joint Publications Research Service, Arlington, Va.

THE COMBINED EFFECT OF AN SHF FIELD AND AN UNFAVORABLE MICROCLIMATE ON THE BODY

V. A. Zhuravlev *In its* Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci., No. 45 (JPRS-71910) 22 Sep. 1978 p 31-35 Transl. into ENGLISH from Voyenno-Med. Zh. (Moscow), no. 3, 1972 p 64-67 (For primary document see N78-33727 24-52)
Copyright. Avail: NTIS HC A03/MF A01

The objective was to establish the effectiveness of the integrated action of microwaves on nonthermal intensities and combinations of individual microclimatic factors. The research was conducted on young female rats that had reached a weight of 155-160 gm by the beginning of the experiment. The experiment showed that exposure of rats to the unfavorable microclimate caused a significant rise in rectal temperature, this increase being most pronounced in response to the combined effect. J.A.M.

53 BEHAVIORAL SCIENCES

Includes psychological factors: individual and group behavior; crew training and evaluation; and psychiatric research.

N78-33731*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ADAPTATION OF TIME LINE ANALYSIS PROGRAM TO SINGLE PILOT INSTRUMENT FLIGHT RESEARCH

David A. Hinton (Louisville Univ.) and John D. Shaughnessy Aug. 1978 41 p refs
(NASA-TM-78748) Avail: NTIS HC A03/MF A01 CSCL 05H

A data base was developed for SPIFR operation and the program was run. The outputs indicated that further work was necessary on the workload models. In particular, the workload model for the cognitive channel should be modified as the output workload appears to be too small. Included in the needed refinements are models to show the workload when in turbulence, when overshooting a radial or glideslope, and when copying air traffic control clearances. G.G.

N78-33732# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

QUANTITATIVE PREDICTIONS OF LENGTH IN THE MUELLER-LYER ILLUSION AS PERCEIVED BY THE HUMAN VISUAL SYSTEM M.S. Thesis

Charles Owen Cornell Mar. 1978 108 p refs
(AD-A055706; AFIT/GE/EE/78M-9) Avail: NTIS HC A06/MF A01 CSCL 05/10

The biologically derived bandwidth characteristics of the human visual system were used to determine the shape parameters of a filter. This filter was used, as a model of the visual system, to produce quantitative predictions of the Mueller-Lyer visual illusion. These predictions were compared to judgments of the length of the shaft of the illusion by human subjects. The best agreement between the subject data and the predictions of the model occurred when the filter had a double exponential shape, a bandwidth of or - 1.0 octave and a center spatial frequency between 2 and 4 cycles per object size. This is the first experiment to show that the filter model could predict similar quantitative distortions of length of the Mueller-Lyer visual illusion as reported by the human subjects. These results support the theory, advocated by Arthur Ginsburg, that the bandwidth limitations of the human visual system are responsible for geometric visual

illusions as well as other visual phenomena such as the Gestalt principles of similarity, proximity and closure. Author (GRA)

N78-33733# Human Engineering Labs., Aberdeen Proving Ground, Md.

AN ANNOTATED BIBLIOGRAPHY OF THE LITERATURE DEALING WITH THE PHYSIOLOGICAL CORRELATES OF COGNITIVE PERFORMANCE Progress Report, 1965 - Jun. 1977

Nicholas J. Carriero, Michael W. Cameron, J. D. Craig, Jules L. Demanss, and John Fite, Jr. Jun. 1978 503 p

(AD-A057113) Avail: NTIS HC A22/MF A01 CSCL 05/8

This bibliography gathers the research literature that deals with physiological correlates of cognitive performance (broadly defined) in situations that have significance and import for military operations. In particular, the focus is on studies that delineate the relationship between physiological variables and optimal or degraded performance. While the literature searched covered the period from 1965 to June 1977, earlier material was included when it was encountered. It contains over 1200 annotated items. Author (GRA)

N78-33734# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.

AIR FORCE AIRCREW TRAINING DEVICES: MASTER PLAN Final Report

Richard E. Worthey Mar. 1978 227 p refs Revised

(AD-A056940; ASD-TR-78-16) Avail: NTIS HC A11/MF A01 CSCL 05/9

Aircrew training in the United States Air Force is addressed from the viewpoint of devices and technologies that are essential to aircrew proficiency, effectiveness and operational readiness. Major operating commands provided current and projected requirements for aircrew training devices for incorporation into formal training programs together with estimates of their impact on flight training. The impact of the instructional systems development (ISD) process on each major operating command's training program is discussed. Issues surrounding the use of platform motion systems are addressed together with the Air Force's initiatives to resolve these issues. Air Force organizational responsibilities are presented and institutional and management problems are delineated. Air Force R and D and acquisition programs and schedules are shown, and an initial attempt is made at diagrammatically depicting the interactions of these programs. Author (GRA)

N78-33735# Tennessee Univ., Knoxville.

ESTIMATION OF THE OPERATING CHARACTERISTICS OF ITEM RESPONSE CATEGORIES 4: COMPARISON OF THE DIFFERENT METHODS

Fumiko Samejimo 30 Jun. 1978 141 p

(Contract N00014-77-C-0360)

(AD-A057161; RR-78-3) Avail: NTIS HC A07/MF A01 CSCL 05/10

The three methods of estimating the operating characteristics of item response categories have been developed and tried on a set of simulated data, in which five hundred hypothetical examinees are assumed and their responses to test items are calibrated by the Monte Carlo method. They are Two-Parameter Beta Method, Normal Approach Method and Pearson System Method. There have been introduced three different categories of methods, i.e., Histogram Ratio Method, Curve Fitting Method and Conditional P.D.F. Method, and they have been tried, mainly, within the context of the Two-Parameter Beta Method. In the present paper, all the findings are summarized and pursued further, in the attempt of reaching a tentative conclusion, with the awareness that we need more varieties of different types of data to fully understand and appreciate each method and technique. Throughout these studies, a polynomial of degree 3 or of degree 4 is used to approximate the marginal density function of the maximum likelihood estimate, to distinguish degree 3 and 4 Cases from each other. Comparison is also made in an attempt to find out whether Degree 4 Case, which obviously has a theoretical advantage over Degree 3 Case, provides as with substantial gain in the accuracy of operating characteristic estimation. Author (GRA)

N78-33736# Northrop Corp., Hawthorne, Calif. Aircraft Group.

PREDICTION, EVALUATION, AND SPECIFICATION OF CLOSED LOOP AND MULTIAXIS FLYING QUALITIES Final Report, Mar. - Dec. 1977

E. D. Onstott and W. H. Faulkner Feb. 1978 278 p

(Contract F33615-77-C-3008)

(AD-A056983; NOR-77-162; AFFDL-TR-78-3) Avail: NTIS HC A13/MF A01 CSCL 05/8

A general technology for the prediction, evaluation, and specification of closed loop and multiaxis flying qualities is documented. A comprehensive scheme for the classification of precision piloted tasks is presented, and a nonlinear multiaxis pilot model is described. Demonstrations of the aircraft/pilot/task analysis method are given for a number of precision piloted tasks and aircraft configurations. The analysis method is also applied to a comparison of Gaussian and non-Gaussian (Reeves) turbulence models, and to a study of the effects of control system lags on tracking performance. Piloted flight simulations were performed to validate all pilot model analyses; complete simulation and pilot model data is presented. Specification methods suitable for MIL-F-8785B are suggested in the areas of step target tracking and pilot reserve attention capacity. A computer analysis method is available from AFFDL/FGC; a user guide, listing, and sample data set are included in the report. Author (GRA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N78-33737# Civil Aeromedical Inst., Oklahoma City, Okla.

EVALUATION OF SEATING AND RESTRAINT SYSTEMS AND ANTHROPOMORPHIC DUMMIES CONDUCTED DURING FISCAL YEAR 1977

Richard F. Chandler and Edwin M. Trout Jun. 1978 73 p refs

(AD-A056905; FAA-AM-78-24) Avail: NTIS HC A05/MF A01 CSCL 01/3

The results of test programs conducted by the Protection and Survival Laboratory to investigate the performance of prototype or operational seating and restraint systems relative to their ability to provide protection against crash injury and to investigate the performance of anthropomorphic dummies in the dynamic environment are reported. L.S.

N78-33738# Army Aeromedical Research Lab., Fort Rucker, Ala.

VISUAL PERFORMANCE/WORKLOAD OF HELICOPTER PILOTS DURING INSTRUMENT FLIGHT Final Report

Ronald R. Simmons, Michael A. Lees, and Kent A. Kimball Jan. 1978 81 p refs

(DA Proj. 3E7-62173-A-819)

(AD-A055424; USAARL-78-6) Avail: NTIS HC A05/MF A01 CSCL 05/9

Flight under instrument flight rules (IFR) is reported to be one of the most important factors contributing to aviator fatigue during helicopter operations. This study was initiated to collect visual and psychomotor performance data in an attempt to investigate and study the general visual performance of aviators during IFR conditions. Two groups of aviators, with varied experience levels, were the subjects. A NAC Eye Mark Recorder and the Helicopter In-Flight Monitoring System were utilized to collect the required data. The results indicated, among other findings, that pilot subjective opinion does not agree with objective data. Additionally, the attitude indicator and radio compass comprised over 60% of the pilots' total visual workload, while the aircraft's status gauges were monitored less than 10% of the total time. These data should provide invaluable information concerning the visual requirements of pilots for safe helicopter operations. Author (GRA)

N78-33739# Air Force Human Resources Lab., Brooks AFB, Tex.

EFFECTS OF PLATFORM MOTION, VISUAL AND G-SEAT FACTORS UPON EXPERIENCED PILOT PERFORMANCE, IN THE FLIGHT SIMULATOR Final Report, Apr. 1976 - Mar. 1977

Philip A. Irish, III and George H. Buckland Jun. 1978 43 p refs

(AD-A055691; AFHRL-TR-78-9) Avail: NTIS HC A03/MF A01 CSCL 05/5

The objective of this study was to empirically assess the performance of experienced pilots in the Advanced Simulator for Pilot Training (ASPT) under varying platform motion, G-seat, field-of-view and ceiling/visibility conditions. Five experienced T-37 pilots flew five contact and instrument maneuvers in the ASPT under all combinations of the independent variables. Automated performance measures based on system parameters, pilot inputs and derived scores were collected and analyzed. The results indicated that expert performances were affected by the motion, field-of-view and ceiling/visibility variables and were often manifested as changes in control behavior rather than vehicle performance. Author (GRA)

N78-33740# Air Force Human Resources Lab., Brooks AFB, Tex.

G-SEAT COMPONENT DEVELOPMENT Final Report, 1 Jul. 1975 - 30 Mar. 1977

William B. Albery and Erick D. Hunter Jun. 1978 32 p refs

(AD-A055533; AFHRL-TR-78-18) Avail: NTIS HC A03/MF A01 CSCL 05/9

An effort was conducted to investigate the improved performance of a closed-loop G-seat system. The Air Force and Navy are currently using G-seats in several training and fighter simulators. These devices are all open-loop systems and exhibit excessive time delays. While these seats exhibit good sustained cueing capability, their performance is marginal in producing overall acceleration cues. Because of sluggish response characteristics, virtually none of the seats can give appropriate acceleration onset cues and be in synchronization with current visual systems. Conventional G-seat components were obtained as well as advanced, position feedback metal bellows, and a closed-loop pneumatic control system was designed and developed. The open- and closed-loop performance of this system was evaluated and the contribution of each component in the G-seat hardware was analyzed. Transfer functions were developed for the pneumatic control system. Author (GRA)

N78-33741# Air Force Human Resources Lab., Brooks AFB, Tex.

EMULATION OF AN ADVANCED G-SEAT ON THE ADVANCED SIMULATOR FOR PILOT TRAINING Final Report, 20 Dec. 1976 - 7 Apr. 1977

William B. Albery and Danny C. McGuire Apr. 1978 36 p refs

(AD-A055532; AFHRL-TR-78-4) Avail: NTIS HC A03/MF A01 CSCL 05/9

An in-house effort was initiated to investigate simple G-seat hardware configurations for the purpose of developing a low-cost approach to G-cuing simulation in flight trainers. The G-seat is a motion and force simulation device which replaces the aircraft seat in a flying training simulator; by virtue of its geometry and software drive, it imparts tactile cues to the seated pilot which are representative of the seat forces normally experienced in actual flight. The Air Force and Navy are procuring G-seats for both training and fighter simulators. These G-seats are research devices, and have up to 32 actuators distributed in the seat pan, backrest, and lap belt. These seats can be improved upon with respect to simpler geometry, fewer active components, and more effective drive algorithms. This report describes a research effort on the Air Force's Advanced Simulator for Pilot Training (ASPT) which culminated in the emulation of an advanced approach to G-seat simulation. The development of the software, the design of the advanced seat components, the implementation of the advanced design on the ASPT, and the results of the study are presented. Author (GRA)

N78-33742# International Business Machines Corp., Oswego, N.Y. Federal Systems Div.

PROGRAM DOCUMENTATION FOR THE TERRAIN AND FLIGHT DYNAMICS PROGRAM

W. E. Brandt, Jr. and K. A. Aldrich (Systems Res. Labs., Inc., Dayton, Ohio) May 1978 36 p

(Contract F33615-75-C-5152; F33615-75-C-0127)

(AD-A056116; AMRL-TR-78-35; AMRC-HESS-78-2) Avail: NTIS HC A03/MF A01 CSCL 05/9

The Terrain and Flight Dynamics (TFD) Program is a real-time, interactive graphics system developed to support the Helmet-Mounted-Display Processor (HMDP) activities. The primary task of the TFD Program is to simulate airframe movement and to supply the resultant dynamic values of aircraft state to the HMDP. Other tasks include the production of an instrument display and a dynamic perspective terrain display. Both displays are on the IBM 2250 and can be remoted by T.V. to the F-16 cockpit if desired. A cockpit selector switch was installed to allow the aircraft to be controlled by either of two sets of cockpit controls, one set in the F-16 cockpit and one set at the 2250 display unit. The program was written for an IBM System/370, Model 155 computer operating under the standard MVT version of the Operating System. Both assembler language and FORTRAN were used in coding the subroutines and the IBM 2250 Graphics Programming Services were utilized for the graphic software support. Author (GRA)

N78-33743# Canyon Research Group, Inc., Westlake Village, Calif.

DESIGN, ANALYSIS, AND INTERPRETATION OF SCREENING STUDIES FOR HUMAN FACTORS ENGINEERING RESEARCH, REVISION Technical Report, Sep. 1976 - Sep. 1977

Charles W. Simon Jun. 1978 239 p refs Revised

(Contract F44620-76-C-0008)

(AD-A056985; CWS-03-77A; AFOSR-78-0055TR-Rev) Avail: NTIS HC A11/MF A01 CSCL 05/5

Methods are described for constructing Resolution IV screening designs that are robust to linear, quadratic, and cubic trend effects and will also keep the number of factor-level changes for some variables at a minimum. Complete designs, capable of screening up to 32 variables, are provided along with appropriate methods of analysis. Numerous criteria for selecting non-trivial variables are discussed, including: mean difference, eta squared, cumulative probability, and half-normal plots. How to handle subjects in an experiment is described when their characteristics can be included as experimental factors and when they cannot be, and when subjects are merely a form of replication. Lack-of-fit tests are provided to help decide whether a second- or a third-order response surface is needed. Numerous methods of analyzing screening studies with multiple responses are described. A method is given for developing a prediction equation with data collected from an incompleted screening design. GRA

N78-33744# Fitzpatrick Engineering, Santa Barbara, Calif.

VEHICLE INTEGRATION AND EVALUATION OF ADVANCED RESTRAINT SYSTEMS. RESTRAINT SYSTEM ANALYSIS REPORT Final Report, Oct. 1977 - Feb. 1978

Michael U. Fitzpatrick Dec. 1977 205 p

(Contracts DOT-HS-6-01307; DOT-NHTSA-8-0147)

(PB-281475/4) Avail: NTIS HC A10/MF A01 CSCL 13F

The results of sled testing and vehicle crash testing of four advanced restraint systems in a compact size automobile are reported. These results were then used to construct a crash survivability envelope for the front seat occupants of the subject vehicle in a variety of accident modes. The vehicle chosen for this effort was the 1976 Volvo 244. The restraint systems chosen to be integrated into the Volvo were: (1) advanced driver airbag system; (2) advanced passenger airbag system; (3) force-limited airbelt system; and (4) force-limited 2-inch belt system. GRA

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering*.

N78-33745 Stanford Univ., Calif.
MULTIPLE ACCESS CHANNELS WITH GENERALIZED FEEDBACK Ph.D. Thesis
Roger Cooper King 1978 76 p
Avail: Univ. Microfilms Order No. 7814181

An achievable rate region is given for multiple access channels with generalized feedback, i.e., feedback not necessarily equal to but only correlated with the channel output. It is shown that generalized feedback can be superior to noiseless feedback for a multiple access channel. Specific examples are given which prove that it is possible to increase capacity to the total cooperative rate bound. A simple achievable rate region is derived for additive white Gaussian noise multiple access channels in which the channel output is a physically degraded form of the feedback. Multiple access channels with sources correlated in a special way are considered. The capacity for such a channel is already known. The known results extends to the case of noiseless feedback. Dissert. Abstr.

N78-33746 Carnegie-Mellon Univ., Pittsburgh, Pa.
CHANGE DETECTION AND ANALYSIS IN MULTI-SPECTRAL IMAGES Ph.D. Thesis
Keith Edward Price 1977 264 p
Avail: Univ. Microfilms Order No. 7815188

Research toward the development of a general image understanding system is described. This system was directed toward the problem of the comparison of pairs of different images of the same scene to generate descriptions of the changes in the scene. To facilitate this symbolic analysis over a wide variety of images, advances in several other areas of image analysis were also required. These areas are: segmentation techniques to generate the basic units used in the symbolic analysis, feature analysis to generate the symbolic description of the regions and image, use of knowledge to guide the segmentation and symbolic registration procedures, and lastly change analysis itself. Several diverse scenes (house, cityscape, satellite images, aerial images, and radar images) are presented, each of which has a task description and a predefined set of knowledge elements, and will show how several different tasks can be performed with a general change analysis system. Dissert. Abstr.

N78-33747 George Washington Univ., Washington, D. C.
SYSTEM DESIGN OF PARALLEL MICROPROCESSORS FOR SOLVING PARTIAL DIFFERENTIAL EQUATIONS Ph.D. Thesis
Arnold Bramson 1978 278 p
Avail: Univ. Microfilms Order No. 7816550

The available inexpensive microprocessors configured in a parallel architecture are significantly more cost-effective than any one of a wide spectrum of uniprocessors. A computer architecture employing parallel microprocessors to solve scientific problems having the complexities of general second-order linear and nonlinear differential equations (PDE's) is developed. Classical and relatively new digital and hybrid solution algorithms are investigated. Problems uncovered led to the development of a new algorithm, the Line-Iterative method; which is especially suited to nonlinear parabolic, elliptic, and hyperbolic PDE's and parallel architectures. Both the proposed parallel array architecture and the new Line-Iterative method were tested using a detailed event-oriented simulation of the coupled nonlinear Navier-Stokes equations. The cost-effectiveness of the parallel array architecture is reflected in the speedup-cost ratio. Dissert. Abstr.

N78-33748 New York Univ., N. Y.
AN EXPERIMENTAL SIMULTANEOUS MULTIPROCESSOR ORGANIZATION Ph.D. Thesis
Gerald Stuart Mersten 1978 297 p
Avail: Univ. Microfilms Order No. 7816139

A simultaneous multiprocessor organization, SAMSON, is proposed for surmounting the fundamental computational limitations of real time uniprocessor architectures. The proposed SAMSON architecture is a data-driven data flow processing system developed for the real time parallel processing of web structures. These webs are directed graphs for the parallel processing of computational expressions. The web structure is a generalization of the tree structure having reduced height (execution time) and minimal width (number of processors.) The fault tolerant characteristics of both the SAMSON PE and the SAMSON system (configured as a fault tolerant system) are studied and achievable error detection through self-test software is evaluated. Dissert. Abstr.

N78-33749 Texas A&M Univ., College Station.
THE TRANSITION-MAP-ENTERED-VARIABLE (T-MEV) MAPPING TECHNIQUE FOR SEQUENTIAL MACHINE DESIGN Ph.D. Thesis
Richard Shady Sandige 1978 89 p
Avail: Univ. Microfilms Order No. 7817211

A new technique for sequential machine design is proposed. The technique combines the transition and map-entered-variable mapping techniques into a completely alternate design procedure which simplifies the design of sequential machines. The transition-map-entered-variable (T-MEV) mapping technique is shown to satisfy the following criteria: 1) can be used without the aid of a computer; 2) can be used for more than six variables; 3) requires only one T-MEV map for each state variable; 4) T-MEV map size will not increase for each additional input variable; 5) control equations for each standard flip-flop type can be obtained from a single T-MEV map. Dissert. Abstr.

N78-33750 State Univ. of New York at Buffalo.
THE DESIGN OF MULTIVALUED LOGIC GATES AND FAULT DETECTION IN MULTIVALUED LOGIC NETWORKS Ph.D. Thesis
Michael Edward Rupp 1978 253 p
Avail: Univ. Microfilms Order No. 7817076

The design of multivalued logic gates and the investigation of methods to allow fault detection in multivalued circuits are presented. The ternary NOT gate is designed and extensively analyzed. Various other gates are introduced and analyzed. A new type of implementation is presented to allow binary AND and OR gates to be substituted for the multivalued MIN and MAX gates, respectively. Attention is then turned to the area of fault detection to multivalued networks. These networks are assumed to be combinational and nonredundant. Two methods of fault detection are introduced. The first is similar to the binary path sensitization. The limitations of this method are derived and then a universal method of fault detection is introduced. Dissert. Abstr.

N78-33751# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.
ARCHITECTURE FOR MULTIPLE INSTRUCTION STREAM LSI PROCESSORS Ph.D. Thesis

William Joseph Kaminsky, Jr. Oct. 1977 131 p refs
(Contract DAAB07-72-C-0259; Grant NSF MCS-73-03488)
(AD-A056110; R-796; UILU-ENG-77-2243) Avail: NTIS HC A07/MF A01 CSCL 09/2

Advancements of the semiconductor industry have produced an exponential increase in the capacity of integrated circuit chips. As this trend continues, much more complex systems will be able to be implemented on a single chip. This research is aimed at studying computer architectures which are most suited for LSI implementation. A pipelined multiprocessor architecture is derived and methodology given which determines a layout for such a processor from a given instruction set. The problem of partitioning a processor when it is too large for one chip is also examined. An evaluation of the performance of the pipelined processor as compared to a single stream processor is made. Three program traces are analyzed to study their usage of registers and this data is used to determine the performance of the processors with various degrees of pipelining and number of data registers. Author (GRA)

N78-33752# International Business Machines Corp., Yorktown Heights, N. Y. Watson Research Center.

A DESIGN-INTERPRETATION ANALYSIS OF NATURAL ENGLISH WITH APPLICATIONS TO MAN-COMPUTER INTERACTION Interim Technical Report

John C. Thomas 13 Jun. 1977 42 p refs
(Contract N00014-72-C-0419)
(AD-A056121; RC-6581) Avail: NTIS HC A03/MF A01 CSCL 09/4

Many behavioral scientists and most designers of man-computer interfaces view communication in a certain way. This viewpoint includes the implicit belief that communication from system A to system B essentially involves the encoding of some internal state in system A into an external statement for transmission to system B. System B decodes this message and changes its internal state. Communication is considered 'good' to the extent that there is an isomorphism between the internal states of the two systems after the message has been sent. This paper argues that this view is inadequate both for an understanding of communication between two persons and as a theoretical foundation for any kind of man-computer interaction, particularly in natural language. Empirical results supporting this proposition are reported. In addition, an alternative view of the communication process is outlined. This view stresses the game-theoretic aspects of communication, the importance of viewing message-building as a constructive (rather than translational) process, the importance of metacomments, the multiplicity of channels involved in human natural language communication, and stresses that, under certain conditions, the 'vagueness', 'fuzziness' and ambiguity of natural language are assets, not liabilities. The paper concludes by discussing some ways these ideas could serve as possible guidelines for the design of man-computer interfaces. GRA

N78-33753# Ohio State Univ., Columbus. Computer and Information Science Research Center.

SIMULATION STUDIES OF THE DATABASE COMPUTER (DBC)

David K. Hsiao and Krishnamurthi Kannan Feb. 1978 36 p refs
(Contract N00014-75-C-0573)
(AD-A056048) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report consists of a series of simulation studies of the hardware throughput of a specialized machine known as the database computer (DBC). Although raw hardware performance of the DBC can be estimated in an order of 80 to 160 times that of conventional software-oriented database management systems, there is the need of knowing the DBC's response time to user access requests, load condition to various request types, and potential bottlenecks which may be caused by uneven performance matching of the key DBC components. The simulation studies are intended to address the need. The simulation programs are written in GPSS and run on an IBM 370/168. All of these results are plotted in graph form. Prediction of the results, interpretation of the graphs, and observation of the deviations are the main effort of the simulation studies. Very good conclusions are obtained concerning the DBC's response time, load condition, and throughput bottleneck. Author (GRA)

N78-33754# Wisconsin Univ. - Madison. Dept. of Computer Sciences.

ON BLOCK RELAXATION TECHNIQUES

D. Boley, B. L. Buzbee and S. V. Parter Jun. 1978 27 p refs
(Contracts N00014-76-C-0341; DAAG29-75-C-0024; W-7405-Eng-36)
(AD-A056749; CSTR-318) Avail: NTIS HC A03/MF A01 CSCL 12/1

In connection with efforts to utilize the CRAY-1 computer efficiently, some methods of analysis of rates of convergence for block iterative methods applied to the model problem are presented. One of the more interesting methods involves relaxing a p x p block of points. A Cholesky decomposition is used for that smaller problem. One of the basic methods of analysis is a modification of a method discussed earlier by Parter. This analysis easily extends to more general second order elliptic problems. Author (GRA)

N78-33755# Naval Environmental Prediction Research Facility, Monterey, Calif.

APPLICATION OF AN ARRAY PROCESSOR IN SATELLITE IMAGE PROCESSING Final Report, 1 Oct. 1976 - 30 Jun. 1977

Pimporn C. Zeleny and Roland E. Nagle 30 Jun. 1977 22 p refs
(Contract MIPR-2165-71-8010)
(AD-A056664; NEPRF-TM-77-01) Avail: NTIS HC A02/MF A01 CSCL 09/2

An array processor was integrated into an interactive graphics display system which incorporates a NOVA 2/10 mini-computer. Difficulties experienced with the installation of this hardware are described. Limitations of the software documentation are itemized. An application of the array processor applied to the suppression of noise in satellite imagery is presented. Results are discussed. GRA

N78-33756# Utah Univ., Salt Lake City. Dept. of Computer Science.

A SYMBOLIC SYSTEM FOR COMPUTER-AIDED DEVELOPMENT OF SURFACE INTERPOLANTS

David Feng and Richard F. Riesenfeld May 1978 57 p refs
(Contract N00014-77-C-0157; Grant NSF MCS-74-13017)
(AD-A056861) Avail: NTIS HC A04/MF A01 CSCL 12/1

The design and implementation of a symbolic input and computation package and its application to the development of several new surface interpolation schemes are described. Capabilities such as the composition of operators and symbolic differentiation have been incorporated into the system. This allows, in particular, the specification of boolean sum projectors. The new schemes which have been implemented include an interpolant to randomly spaced data and a 'shape operator' which has quadratic precision. Author (GRA)

N78-33757# Rochester Univ., N. Y. Production Automation Project.

DISSEMINATION OF THE PADL-1.0/N PROCESSOR: PART AND ASSEMBLY DESCRIPTION LANGUAGE (PADL)

H. B. Peirce and H. B. Voelcker Oct. 1977 33 p refs
(Grant NSF APR-76-01034)
(PB-281549/6; PADL/ADM-01; NSF/RA-770464) Avail: NTIS HC A03/MF A01 CSCL 09B

Part and assembly description language (PADL) is a convenient language for describing simple (unsculptured) mechanical parts and assemblies in a precise and geometrically complete manner. The processor for PADL-1.0 is a suite of computer programs written in structured FORTRAN, and is capable of generating automatically, on command, mechanical drawings of any part or assembly describable in PADL-1.0. The constraints that affect dissemination, the package specifications to be disseminated, the license agreement that defines the conditions incumbent on users, the current eligibility criteria, and the procedure for obtaining the PADL package are also discussed. GRA

N78-33758# Rochester Univ., N. Y. Production Automation Project.

THE PADL-1.0/N PROCESSOR: OVERVIEW AND SYSTEM DOCUMENTATION

W. B. Fisher, E. E. Hartquist, A. A. G. Requicha, and H. B. Voelcker Oct. 1977 54 p refs
(Grants NSF GI-34274; NSF APR-76-01034)
(PB-281550/4; PADL/SD-01
Avail: NTIS HC A04/MF A01 CSCL 09B

This PADL/SD series provides system documentation for the PADL-1.0/n processor. The series is directed at system programmers, analysts, and software designers, not at ordinary users of PADL systems. An overview of the PADL system is presented, along with the PADL processor's internal organization. The approach to documentation and a guide to other relevant documents is included. GRA

N78-33759# Rochester Univ., N. Y. Production Automation Project.
REPRESENTATIONS IN THE PADL-1.0/N PROCESSOR: SIMPLE GEOMETRIC ENTITIES Final Report
R. B. Tilove Nov. 1977 79 p refs
(Grant NSF GI-34274; NSF APR-76-01034)
(PB-281551/2; PADL/SD-02; NSF/RA-770479) Avail: NTIS HC A05/MF A01 CSCL 09B

Simple geometric entities were represented: primitive solids, primitive faces of primitive solids (pfaces), and space curves defined by pairwise intersections of pfaces. The mathematical representations used for simple geometric entities are described, as well as how these mathematical representations are implemented in the PADL-1.0/n processor. The primary goals are: (1) to relate the data found in boundary files to the faces and edges they designate; and (2) to provide a mathematical basis for the representation of simple geometric entities in an extended PADL processor, e.g., one that caters to arbitrary orientation. GRA

N78-33760# Rochester Univ., N. Y. Production Automation Project.
REPRESENTATIONS IN THE PADL-1.0/N PROCESSOR: BOUNDARY REPRESENTATIONS AND THE BFILE/1 SYSTEM
E. E. Hartquist, H. B. Voelcker, G. T. Armstrong, R. W. Moote, and R. B. Tilove Dec. 1977 73 p refs
(Grants NSF GI-34274; NSF APR-76-01034)
(PB-281552/0; PADL/SD-10; NSF/RA-770480) Avail: NTIS HC A04/MF A01 CSCL 09B

The BFILE/1 is a self-contained set of FLECS/FORTRAN subroutines for managing boundary representations of solids. Although BFILE/1 may be used independently of the PADL system, it was designed as a repository for data generated by the PADL-1.0/2.n boundary evaluator and is best regarded as a PADL subsystem. The mathematical models and data representations which underlie BFILE/1 were defined. The BFILE/1's naming conventions and its repertoire of subroutines and functions were explained. The last major section describes the current implementation of BFILE/1. GRA

N78-33761# National Bureau of Standards, Washington, D. C. Inst. for Computer Sciences and Technology.
A COST BENEFIT ANALYSIS OF PROPOSED FEDERAL INPUT/OUTPUT CHANNEL LEVEL COMPUTER INTERFACE STANDARDS
Jun. 1978 38 p refs
(PB-282406/8; NBSIR-78-1487) Avail: NTIS HC A03/MF A01 CSCL 09B

The results of an analysis of the cost savings that are expected to accrue to the Federal Government through use of four proposed Federal input/output channel level computer interface standards are summarized. The analysis is based on the best available data, and the results are intended to be a best conservative estimate of the potential Federal Government cost savings that will occur through use of the proposed interface standards to increase competition in the procurement of computer peripheral equipment. The analysis concludes that the Federal Government will accrue cost savings through use of this standard of over $55 million during the five year period beginning in FY 1979. GRA

N78-33762# National Bureau of Standards, Washington, D. C. D.C. Inst. for Computer Sciences and Technology.
COMPUTER SCIENCE AND TECHNOLOGY: THE DESIGN AND IMPLEMENTATION OF THE NATIONAL BUREAU OF STANDARDS' NETWORK ACCESS MACHINE (NAM) Interim Report, Jun. 1977 - Jun. 1978
Robert Rosenthal and Bruce D. Lucas Jun. 1978 54 p refs
(PB-282510/7; NBS-SPECIAL-PUB-500-35) Avail: NTIS HC A04/MF A01 CSCL 09B

The Network Access Machine (NAM), a programmed minicomputer designed to assist interactive on-line terminal users of computer network services and resources, is discussed in detail. The minicomputer allows the user to specify (or to have specified) network command sequences for execution on a specified network and host connected to that network. Computer responses are analyzed to assure agreement with those anticipated for specific commands. Experience with the NAM and specific examples of NAM use including a common command language for bibliographic retrieval are presented. GRA

N78-33763# National Technical Information Service, Springfield, Va.
COMPUTER INFORMATION SECURITY AND PROTECTION, VOLUME 1. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jun. 1977
David W. Grooms Aug. 1978 357 p
(NTIS/PS-78/0859/5) Avail: NTIS HC $28.00/MF $28.00 CSCL 09B

The bibliography of Federally-funded research covers the various aspects of computer information security and computer privacy, including personal privacy, reliability of security procedures, natural disasters, audits, electronic crime, implications of the Privacy Act of 1974, and software design for efficiency checks. The military intelligence aspects of computer privacy and the private social implications are also included. (This updated bibliography contains 350 abstracts, none of which are new entries to the previous edition). GRA

N78-33764# National Technical Information Service, Springfield, Va.
COMPUTER INFORMATION SECURITY AND PROTECTION, VOLUME 2. CITATIONS FROM THE NTIS DATA BASE Progress Report, Jul. 1977 - May 1978
George W. Reimherr Aug. 1978 136 p Supersedes NTIS/PS-77/0629; NTIS/PS-76/0562; NTIS/PS-75/437
(NTIS/PS-78/0860/3; NTIS/PS-77/0629; NTIS/PS-76/0562; NTIS/PS-75/437) Avail: NTIS HC $28.00/MF $28.00 CSCL 09B

The bibliography of Federally-funded research covers the various aspects of computer information security and computer privacy, including personal privacy, reliability of security procedures, natural disasters, audits, electronic crime, implications of the Privacy Act of 1974, and software design for efficiency checks. (This updated bibliography contains 50 abstracts, all of which are new entries to the previous edition). GRA

N78-33765# National Technical Information Service, Springfield, Va.
COMPUTER INFORMATION SECURITY AND PROTECTION. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - May 1978
George W. Reimherr Aug. 1978 57 p Supersedes NTIS/PS-77/06300; NTIS/PS-76/0563
(NTIS/PS-78/0861/1; NTIS/PS-77/0630; NTIS/PS-76/0563) Avail: NTIS HC $28.00/MF $28.00 CSCL 09B

The bibliography of worldwide research includes the various aspects of computer information security and computer privacy, including personal privacy, reliability of security procedures, natural disasters, audits, electronic crime, and software design for efficiency checks. (This updated bibliography contains 182 abstracts, 24 of which are new entries to the previous edition.) GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N78-33766 Carnegie-Mellon Univ., Pittsburgh, Pa.
DISTRIBUTED DATA PROCESSING: MICROCOMPUTER ELEMENTS AND DESIGN AIDS Ph.D. Thesis
Richard S. Dippolito 1978 173 p
Avail: Univ. Microfilms Order No. 7814380

Increasing interest in designing and evaluating distributed data processing (DDP) systems has led to the need for processing components more suitable to the application. Advances in integrated circuit technology have now made it attractive to use inexpensive, single-chip microcomputers in these applications. Developing a basis for the evolution of new techniques and components that will be expected to provide the solution is attempted. These specifications are then used to develop a microcomputer architecture with the necessary features. This microcomputer is then used to implement a portion of the original system example. Simulation languages are presented as an integral part of DDP system design. Two such languages, LOGICSPEC and ISPL, are tested for features necessary for efficient simulation of multiple processor computing systems. Desirable and undesirable features of each are enumerated and suggestions for improvement are offered. Useful features of a next-generation language are presented. Dissert. Abstr.

N78-33767 Stanford Univ., Calif.
SOURCE AND CHANNEL CODING THEORY Ph.D. Thesis
James George Dunham 1978 214 p
Avail: Univ. Microfilms Order No. 78-14167

Block stationary codes represent the class of all physically stationary coding structures and include the two most general classes of coding structures considered in the information theory literature: block and sliding-block codes. The sliding-block entropy compression coding with a fidelity criterion theorem, relating the Optimal Performance Theoretically Attainable (OPTA) function for sliding-block codes to the distortion-rate function D(R), is extended to all abstract alphabet, stationary and ergodic sources with a nonmetric single-letter fidelity criteria. The sliding-block entropy compression coding theorem is coupled with a theorem on sliding-block joint noiseless-source/channel coding to establish a sliding-block joint source-channel coding theorem. A new method of channel coding using a per symbol error criterion and these new channel codes are compared with time-invariant convolutional block channel codes. Dissert. Abstr.

N78-33768 Syracuse Univ., N. Y.
ANALOG ALGEBRAIC DECODING OF LINEAR BLOCK CODES Ph.D. Thesis
Tai-Yang Hwang 1977 95 p
Avail: Univ. Microfilms Order No. 7813311

Soft-decision decoding was investigated for the class of linear block codes. A new soft-decision decoding technique called radius-s decoding is proposed. In this decoding rule, any received word which has Euclidean distance less than s from a code word is decoded onto that code word. A nearest-neighbor decoding algorithm in the code domain is proposed. This algorithm employs a proper subset of the set of all code words and is thus nonexhaustive. Preliminary results on iterative decoding are presented. Dissert. Abstr.

N78-33769 California Univ., Berkeley.
OPTIMIZATION ALGORITHMS FOR COMPUTER AIDED DESIGN PROBLEMS Ph.D. Thesis
Russell Edward Trahan, Jr. 1977 112 p
Avail: Univ. Microfilms Order No. 7812801

Optimization in computer aided design is considered. Various computational methods are presented for solving these optimization problems. A new algorithm is presented for solving infinitely constrained problems. This algorithm is a feasible directions type algorithm. This algorithm is a combined direct search-descent method where a modified method of local variations is combined with feasible directions type spacer steps. Also included are the implementable forms of the feasible directions algorithm and the outer approximations algorithm. By implementable, it is meant that no single iteration requires an infinite number of function evaluations or arithmetical operations. The direct search-descent method can be modified in an obvious way in order to obtain an implementable algorithm. Dissert. Abstr.

N78-33770 Carnegie-Mellon Univ., Pittsburgh, Pa.
THE ARGOS IMAGE UNDERSTANDING SYSTEM Ph.D. Thesis
Steven Michael Rubin 1978 116 p
Avail: Univ. Microfilms Order No. 7815190

ARGOS is an image understanding system. It builds a three-dimensional model of the task domain and uses hypothesized two-dimensional views of the model to label images. The labeling technique used by ARGOS is called Locus search. Locus is a non-backtracking graph search technique in which a beam of near-miss alternatives around the best path are extended in parallel through the graph. Image understanding is formulated as a problem of search; shows how Locus search can be used to label images; describes the many sources of knowledge used in the interpretation; shows how knowledge represented as a network can be used to constrain the search; explores extensions to the use of knowledge; and presents the experimental results of ARGOS. Its main contributions are the demonstration that Locus search can be used for image understanding and the exploration of issues involved to this use. Dissert. Abstr.

N78-33771 Arizona State Univ., Tempe.
ANALYSIS OF PARALLEL SYSTEM DESIGN USING CONTEXT-FREE GRAMMARS Ph.D. Thesis
Jimmy Allen Murphy 1978 200 p
Avail: Univ. Microfilms Order No. 7815239

An analysis system was defined that uses the technique of describing a finite automaton with a BNF Grammar. A System Description Language was defined that can express the relationships between the states of the machine and that can also express those attributes required to build the state tables for a Markov simulation model. Some general concepts in the construction of algorithms to build the state tables are discussed. Some tips and techniques were developed to help avoid describing the finite state machine in ways that result in ambiguous grammars. Some types of system errors that are detectable with the analysis system are defined. The significant conclusion drawn is that some types of conceptual errors in system design can be detected in the preliminary design phase with the tools defined here and it was shown that the detection of errors in this phase results in significant cost savings over the detection of the errors later in the development cycle. Dissert. Abstr.

N78-33772 Rice Univ., Houston, Tex.
STUDY OF A CLASS OF PARALLEL PROGRAMS Ph.D. Thesis
Naresh Dhanraj Jotwani 1978 140 p
Avail: Univ. Microfilms Order No. 78-14768

A class of parallel programs, based on Free Choice Petri nets, is modeled by associating operators and predicates with vertices of the net. The model, called a formal parallel program (FPP), forms natural extension of flow-chart notation to parallel programs. Structural properties of well-behaved parallel program graphs are investigated, starting with a pair of reduction procedures which determine the liveliness and safeness of Free Choice Petri nets. Based on this analysis, an algorithm is presented which finds a top-down FPP simulating a given FPP. Results indicate in some cases there is a loss of parallelism involved when an FPP is simulated by a top-down FPP, using as the measure of parallelism the number of different ways of carrying out a computation. This phenomenon is fully investigated, and necessary and sufficient conditions for a given FPP to be simulated by a top-down FPP, without loss of parallelism, are determined. Dissert. Abstr.

N78-33773 Oklahoma Univ., Norman.
AN INTERACTIVE SYSTEM FOR THE GENERATION OF STANDARDIZED AUTOPSY PROTOCOLS Ph.D. Thesis
Seymour Fox 1977 388 p
Avail: Univ. Microfilms Order No. 7815358

An interactive standardized autopsy protocol generation system was designed and implemented which demonstrates a unique approach to generating narrative reports interactively. The nucleus of the system is the pathology information data base which contains two complementary files: (1) the frame file and (2) the output text file. To permit the generation of grammatically correct English sentences, a file of sentences was created which, in effect, expanded the information contained in the flow

diagrams to sentences. A detailed description of the logical organization of the system software and the various operations involved in the generation of autopsy protocol is presented. A discussion of the various features which were incorporated into the system software to facilitate the interaction between the pathologist and the system is also included. Dissert. Abstr.

N78-33774 Yale Univ., New Haven, Conn.
AGGREGATION IN LINEAR PROGRAMMING Ph.D. Thesis
Paul Herbert Zipkin 1977 197 p
Avail: Univ. Microfilms Order No. 7817159

One of the major problems in any applied modeling effort is the choice of the level of detail to be incorporated in the model. The modeller must balance somehow the accuracy of the model with the costs of data development and computation. To do so, it is necessary to judge the amount of accuracy lost in moving from a detailed to a more aggregated model. Methods for assessing such losses in accuracy in linear programming are developed. The major results of the study consist of bounds on the accuracy lost in the process of aggregation. Two types of bounds are derived: A posteriori bounds may be calculated after solving the aggregate problem, but without having to solve the original problem, while a priori bounds are available before solving either problem. Algorithms are presented for improving the accuracy of an aggregate problem. Dissert. Abstr.

N78-33775 Wisconsin Univ. - Madison.
EXTENSION MECHANISMS FOR HIGH-LEVEL PROGRAMMING LANGUAGES Ph.D. Thesis
Bertil Sten Gustav Beander 1978 192 p
Avail: Univ. Microfilms Order No. 7811710

A new syntactic extension mechanism capable of specifying the kind of syntax typically found in high-level programming languages is described, and two classes of extensible languages based on this mechanism, one statement-oriented and one expression-oriented, are defined. Semantic extension mechanisms are described which allow user-defined compile-time and run-time data objects to be bound directly to the kinds of semantic constructs typically found in high-level languages. Relaxed extensions may be encapsulated in extension packages which can export all legal definitions, including syntactic and semantic extensions, to their users compile-time environments. Mechanisms which give the extension designer control over run-time memory allocation and management are defined. Dissert. Abstr.

N78-33776*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ENGINEERING AND SCIENTIFIC DATA MANAGEMENT
1978 255 p refs Proc. of Conf. held at Hampton, Va., 18-19 May 1978 Sponsored in part by the Inst. for Computer Appl. in Sci. and Eng., and the George Washington Univ. Joint Inst. for Advan. of Flight Sci., Hampton, Va.
(NASA-CP-2055; L-12043) Avail: NTIS HC A12/MF A01 CSCL 09B

The application of data management systems to engineering and scientific data is described. For individual titles, see N78-33777 through N78-33787.

N78-33777*# Carnegie-Mellon Univ., Pittsburgh, Pa.
DESIGN REPRESENTATION AND CONSISTENCY MAINTENANCE NEEDS
Charles M. Eastman and Steven J. Fenves *In* NASA. Langley Res. Center Eng. and Sci. Data Management 1978 p 1-18 refs (For primary document see N78-33776 24-61)
(Contract N00014-76-C-0345; Grant NSF MCS-76-19072)
Avail: NTIS HC A12/MF A01 CSCL 09B

Two major issues of data base support for large-scale engineering design are considered. The first deals with the need to support multidisciplinary, hierarchical and interactive design without imposing a priori constraints on the sequence of design decisions. An abstract logical model of the data base capable of such support is outlined. The second issue deals with the role the data base must play in maintaining integrity and consistency among the data representing the emerging design. A tentative model implementing a number of consistency management functions is presented. G.G.

N78-33778*# Pratt and Whitney Aircraft, East Hartford, Conn.
CAD/CAM DATA MANAGEMENT NEEDS, REQUIREMENTS AND OPTIONS
Richard S. Lopatka and Thomas G. Johnson *In* NASA. Langley Res. Center Eng. and Sci. Data Management 1978 p 25-54 refs (For primary document see N78-33776 24-61)
Avail: NTIS HC A12/MF A01 CSCL 09B

The requirements for a data management system in support of technical or scientific applications and possible courses of action were reviewed. Specific requirements were evolved while working towards higher level integration impacting all phases of the current design process and through examination of commercially marketed systems and related data base research. Arguments are proposed for varied approaches in implementing data base systems ranging from no action necessary to immediate procurement of an existing data base management system. G.G.

N78-33779*# Ford Motor Co., Dearborn, Mich.
ADVANCED PROGRAM WEIGHT CONTROL SYSTEM
G. T. Derwa *In* NASA. Langley Res. Center Eng. and Sci. Data Management 1978 p 55-63 (For primary document see N78-33776 24-61)
Avail: NTIS HC A12/MF A01 CSCL 09B

The design and implementation of the Advanced Program Weight Control System (APWCS) are reported. The APWCS system allows the coordination of vehicle weight reduction programs well in advance so as to meet mandated requirements of fuel economy imposed by government and to achieve corporate targets of vehicle weights. The system is being used by multiple engineering offices to track weight reduction from inception to eventual production. The projected annualized savings due to the APWCS system is over $2.5 million. G.G.

N78-33780*# Bell Helicopter Co., Fort Worth, Tex.
A DATA MANAGEMENT SYSTEM FOR WEIGHT CONTROL AND DESIGN-TO-COST
Jerry C. Bryant *In* NASA. Langley Res. Center Eng. and Sci. Data Management 1978 p 65-84 (For primary document see N78-33776 24-61)
Avail: NTIS HC A12/MF A01 CSCL 09B

The definition of the mass properties data of aircraft changed on a daily basis as do design details of the aircraft. This dynamic nature of the definition has generally encouraged those responsible for the data to update the data on a weekly or monthly basis. The by-product of these infrequent updates was the requirement of manual records to maintain daily activity. The development of WAVES changed the approach to management of mass properties data. WAVES has given the ability to update the data on a daily basis thereby eliminating the need for manual records. WAVES has demonstrated that a software product can support a data management system for engineering data. G.G.

N78-33781*# General Motors Corp., Detroit, Mich.
ASSOCIATIVE PROGRAMMING LANGUAGE AND VIRTUAL ASSOCIATIVE ACCESS MANAGER
Carol Price *In* NASA. Langley Res. Center Eng. and Sci. Data Management 1978 p 85-97 refs (For primary document see N78-33776 24-61)
Avail: NTIS HC A12/MF A01 CSCL 09B

APL provides convenient associative data manipulation functions in a high level language. Six statements were added to PL/1 via a preprocessor: CREATE, INSERT, FIND, FOR EACH, REMOVE, and DELETE. They allow complete control of all data base operations. During execution, data base management programs perform the functions required to support the APL language. VAAM is the data base management system designed to support the APL language. APL/VAAM is used by CADANCE, an interactive graphic computer system. VAAM is designed to support heavily referenced files. Virtual memory files, which utilize the paging mechanism of the operating system, are used. VAAM supports a full network data structure. The two basic blocks in a VAAM file are entities and sets. Entities are the basic information element and correspond to PL/1 based structures defined by the user. Sets contain the relationship information and are implemented as arrays. G.G.

N78-33782*# National Center for Atmospheric Research, Boulder, Colo.
MANAGEMENT OF ATMOSPHERIC DATA
Roy L. Jenne and Dennis H. Joseph *In* NASA. Langley Res. Center Eng. and Sci. Data Management 1978 p 129-139 refs (For primary document see N78-33776 24-61)
Avail: NTIS HC A12/MF A01 CSCL 09B

The establishment and maintenance of meteorological data archives to support various research projects are outlined. Consideration is given to overall data needs for meteorological and climatic research in the university community and to establish the climatology of the Southern Hemisphere from the surface to 10 kPa (100 millibars). G.G.

N78-33783*# Boeing Computer Services, Inc., Seattle, Wash.
SDMS: A SCIENTIFIC DATA MANAGEMENT SYSTEM
William A. Massena *In* NASA. Langley Res. Center Eng. and Sci. Data Management 1978 p 143-154 refs (For primary document see N78-33776 24-61)
Avail: NTIS HC A12/MF A01 CSCL 09B

SDMS is a data base management system developed specifically to support scientific programming applications. It consists of a data definition program to define the forms of data bases, and FORTRAN-compatible subroutine calls to create and access data within them. Each SDMS data base contains one or more data sets. A data set has the form of a relation. Each column of a data set is defined to be either a key or data element. Key elements must be scalar. Data elements may also be vectors or matrices. The data elements in each row of the relation form an element set. SDMS permits direct storage and retrieval of an element set by specifying the corresponding key element values. To support the scientific environment, SDMS allows the dynamic creation of data bases via subroutine calls. It also allows intermediate or scratch data to be stored in temporary data bases which vanish at job end. G.G.

N78-33784*# Informatics-PMI, Inc., Palo Alto, Calif.
X10: A FORTRAN DIRECT ACCESS DATA MANAGEMENT SYSTEM
David P. Roland *In* NASA. Langley Res. Center Eng. and Sci. Data Management 1978 p 155-182 (For primary document see N78-33776 24-61)
(Contract NAS2-6914)
Avail: NTIS HC A12/MF A01 CSCL 09B

The XIO system is a set of subroutines that provide generalized data management capability for FORTRAN programs using a direct access file. Arrays of integer, real, double precision, and character data may be stored, each logical group of data identified by a unique matrix number. A matrix may be organized and stored as batches to reduce core requirements. Batches may be accessed randomly or sequentially. The file may be checkpointed and retained, allowing for restarts with stored values. The XIO subroutines operate on either IBM 360-370/OS/VS or DEC PDP-11/RSX computing systems. G.G.

N78-33785*# Boeing Computer Services, Inc., Seattle, Wash.
RIM: A PROTOTYPE FOR A RELATIONAL INFORMATION MANAGEMENT SYSTEM
Dennis L. Comfort and Wayne J. Erikson *In* NASA. Langley Res. Center Eng. and Sci. Data Management 1978 p 183-196 (For primary document see N78-33776 24-61)
Avail: NTIS HC A12/MF A01 CSCL 09B

An overview of the relational information management (RIM) system is provided. RIM is a prototype data management system for the Aerospace Vehicle design (IPAD) project. G.G.

N78-33786*# Texas Univ. at Austin.
A DATA MANAGEMENT SYSTEM FOR ENGINEERING AND SCIENTIFIC COMPUTING
Linda Elliot, Hideko S. Kunii, and J. C. Browne *In* NASA. Langley Res. Center Eng. and Sci. Data Management 1978 p 197-222 refs (For primary document see N78-33776 24-61)
(Grant NsG-1446)
Avail: NTIS HC A12/MF A01 CSCL 09B

Data elements and relationship definition capabilities for this data management system are explicitly tailored to the needs of engineering and scientific computing. System design was based upon studies of data management problems currently being handled through explicit programming. The system-defined data element types include real scalar numbers, vectors, arrays and special classes of arrays such as sparse arrays and triangular arrays. The data model is hierarchical (tree structured). Multiple views of data are provided at two levels. Subschemas provide multiple structural views of the total data base and multiple mappings for individual record types are supported through the use of a REDEFINES capability. The data definition language and the data manipulation language are designed as extensions to FORTRAN. Examples of the coding of real problems taken from existing practice in the data definition language and the data manipulation language are given. G.G.

N78-33787*# Naval Ship Research and Development Center, Annapolis, Md.
ENGINEERING DATA MANAGEMENT: EXPERIENCE AND PROJECTIONS
David K. Jefferson and Bernard Thomson *In* NASA. Langley Res. Center Eng. and Sci. Data Management 1978 p 223-242 refs (For primary document see N78-33776 24-61)
Avail: NTIS HC A12/MF A01 CSCL 09B

Experiences in developing a large engineering data management system are described. Problems which were encountered are presented and projected to future systems. Business applications involving similar types of data bases are described. A data base management system architecture proposed by the business community is described and its applicability to engineering data management is discussed. It is concluded that the most difficult problems faced in engineering and business data management can best be solved by cooperative efforts. G.G.

N78-33788*# Alabama A & M Univ., Huntsville. Dept. of Computer and Information Sciences.
A COMPARISON OF HARDWARE DESCRIPTION LANGUAGES Final Report
Sajjan G. Shiva Oct. 1978 115 p refs
(Grant NsG-8057)
(NASA-CR-157762) Avail: NTIS HC A06/MF A01 CSCL 09B

Several high level languages which evolved over the past few years for describing and simulating the structure and behavior of digital systems, on digital computers are assessed. The characteristics of the four prominent languages (CDL, DDL, AHPL, ISP) are summarized. A criterion for selecting a suitable hardware description language for use in an automatic integrated circuit design environment is provided. A.R.H.

N78-33789*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A PARAMETER ESTIMATION SUBROUTINE PACKAGE
G. J. Bierman and M. W. Nead 15 Oct. 1978 144 p refs Revised
(Contract NAS7-100)
(NASA-CR-157766; JPL-Pub-77-26-Rev-2) Avail: NTIS HC A07/MF A01 CSCL 09B

Linear least squares estimation and regression analyses continue to play a major role in orbit determination and related areas. A library of FORTRAN subroutines were developed to facilitate analyses of a variety of estimation problems. An easy to use, multi-purpose set of algorithms that are reasonably efficient and which use a minimal amount of computer storage are presented. Subroutine inputs, outputs, usage and listings are given, along with examples of how these routines can be used. The routines are compact and efficient and are far superior to the normal equation and Kalman filter data processing algorithms that are often used for least squares analyses. S.E.S.

N78-33790 Yale Univ., New Haven, Conn.
AUTOMATIC GENERATION OF CODE GENERATORS Ph.D. Thesis
Christopher Warwick Fraser 1977 93 p
Avail: Univ. Microfilms Order No. 7815908

The XGEN, an automatic programming system that derives a good local code generator for an ALGOL-like language from a simple, general machine description is described. XGEN is a large production system, successively applying rules that explicitly encode bits of the assembly language programming skills that humans apply daily. XGEN contributes to our understanding of the impact of machine architecture on programming languages,

by providing a useful definition of what code generators must know about programs and machines to produce good code across a wide range of architectures. Dissert. Abstr.

N78-33791*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GUIDE TO A CONDENSED FORM OF NASTRAN
James L. Rogers, Jr. Sep. 1978 297 p refs
(NASA-RP-1019; L-11900) Avail: NTIS HC A13/MF A01 CSCL 09B

A limited capability form of NASTRAN level 16 is presented to meet the needs of universities and small consulting firms. The input cards, the programming language of the direct matrix abstraction program, the plotting, the problem definition, and the modules' diagnostic messages are described. Sample problems relating to the analysis of linear static, vibration, and buckling are included. This guide can serve as a handbook for instructional courses in the use of NASTRAN or for users who need only the capability provided by the condensed form. A.R.H.

N78-33792# Foster-Miller Associates, Inc., Waltham, Mass.
SHAKE TESTING OF VEHICLES THROUGH RECORDED SIMULATION CONTROL SCHEME, VOLUME 1 Final Report, Sep. 1976 - Feb. 1978
A. B. Boghani, K. M. Captain, and R. B. Fish Jan. 1978 119 p refs 2 Vol.
(Contract DAAK30-76-C-0004)
(AD-A056543; TAC-7622-Vol-1; TARADCOM-TR-12347-Vol-1) Avail: NTIS HC A06/MF A01 CSCL 09/2

Recorded simulation control scheme described in this report is a method of providing realistic inputs to a vehicle shaker. The scheme involves generating axle displacement records by simulating motion of the vehicle operation on the specified terrain, storing the records in memory of a control system and using them to provide input signals to the vehicle shaker. A terrain-tire-vehicle model needed to simulate vehicle motion is developed. The vehicle selected for the model is a typical three axle military truck. The tires are represented by any of these independently developed models: point contact model, rigid tread band model, fixed footprint model and adaptive footprint model. A comparison of the analytical and the field test results demonstrates that the vehicle motion is adequately simulated, particularly when the adaptive footprint or the fixed footprint tire model is employed. The control system developed for storing the axle displacement records and playing them back incorporates a minicomputer, disc memory and input-output peripherals. Spectral densities of the shaker input signals generated by the control system agree well with those obtained from the test results, thereby verifying ability of the recorded simulation control scheme. Author (GRA)

N78-33793# Foster-Miller Associates, Inc., Waltham, Mass.
RECORDED SIMULATION CONTROL SCHEME: USER'S MANUAL, VOLUME 2, SUPPLEMENT Final Report, Sep. 1976 - Feb. 1978
Ashok B. Boghani and Roger B. Fish Jan. 1978 192 p refs 2 Vol.
(Contract DAAK30-76-C-0004)
(AD-A056544; TAC-7622-Vol-2; TARADCOM-TR-12347-Vol-2) Avail: NTIS HC A09/MF A01 CSCL 09/2

Recorded simulation control scheme is a method of generating realistic inputs for vehicle shake tests. The scheme involves generating axle displacement records by simulating vehicle operation over the specified terrain, storing the records in memory of a control system and using them to provide input signals to the vehicle shaker. This user's manual provides instructions on implementing the scheme in terms of two steps. Step 1: A complete program which can simulate motion of a three axle military truck using any of the previous developed four tire models is described. The tire models are: point contact model, rigid tread band model, fixed footprint model and adaptive footprint model. Instructions on using the program to create axle displacement records are given along with an illustrative example. Step 2: A control system which employs a digital processor, disc memory and input-output peripherals to generate shaker input signals from the displacement records is described. Instructions on operating the control system are provided throu typical examples. Author (GR

N78-33794# Illinois Univ. at Urbana-Champaign, Urbana. Coordinated Science Lab.
A COMPUTER HARDWARE DESIGN LANGUAGE FOR MULTIPROCESSOR SYSTEMS Ph.D. Thesis
Trevor Nigel Mudge Sep. 1977 144 p refs
(Contract DAAB07-72-C-0259)
(AD-A056111; R-787; UILU-ENG-77-2234) Avail: NTIS HC A07/MF A01 CSCL 09/2

This thesis develops a computer hardware design language that: (1) has sufficient scope to describe multiprocessing systems; and (2) is specified so that syntactically correct programs describe systems which have deadlock-free control structures. This, it is shown, is accomplished without resorting to an unduly complex syntax for the language. The control problem associated with multiprocessing is quite complex, and the opportunities for creating a control structure which can hang-up are great. Specifying the computer hardware design language so that this pitfall can be avoided by staying within the bounds of the syntax, gives the user a true design tool which is more than just an aid for documenting the principles of operation of a system. The computer hardware design language can be used to design digital systems which conform to the following model: the system partitions into a hierarchically organized asynchronous control structure and a data structure. Actions in the data structure are assumed to be representable as register-transfers. The coordination of these actions is accomplished by the control structure. Two approaches to implementing the computer hardware design language programs are discussed. The first is an asynchronous realization using asynchronous modules; the second a pseudo-asynchronous realization - it is a synchronous realization that is viewed as an asynchronous one. GRA

N78-33795# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
PORTABILITY TECHNIQUES FOR BLISS PROGRAMS Interim Report
Bruce W. Leverett, Paul J. Knueven, and Peter G. Hibbard Nov. 1977 81 p refs
(Contract F44620-73-C-0074; ARPA Order 2466)
(AD-A056066; AFOSR-78-1085TR) Avail: NTIS HC A05/MF A01 CSCL 09/2

The problems of writing large systems in BLISS that can be run in more than one environment are described. A method (a set of methods) for attacking these problems is explained, with examples of its use in a particular system (a compiler). Aspects of the BLISS language are discussed with regard to their usefulness or uselessness in solving these problems.
Author (GRA)

N78-33796# Texas Univ. at Austin. Center for Cybernetic Studies.
A SPECIAL PURPOSE LINEAR PROGRAMMING ALGORITHM FOR OBTAINING LEAST ABSOLUTE VALUE ESTIMATORS IN A LINEAR MODEL WITH DUMMY VARIABLES
Ronald D. Armstrong and Edward Frome (Oak Ridge Associated Univ., Tenn.) Sep. 1977 21 p refs
(Contract N00014-75-C-0569; Grant NSF MCS-707-00100)
(AD-A056762; CCS-318) Avail: NTIS HC A02/MF A01 CSCL 12/1

Dummy (0, 1) variables are frequently used in statistical modeling to represent the effect of certain extraneous factors. This paper presents a special purpose linear programming algorithm for obtaining least-absolute-value estimators in a linear model with dummy variables. The algorithm employs a compact basis inverse procedure and incorporates the advanced basis exchange techniques available in specialized algorithms for the general linear least-absolute-value problem. Computational results with a computer code version of the algorithm are given.
Author (GRA)

N78-33797# Perceptronics, Inc., Woodland Hills, Calif.
APPLICATION OF ADAPTIVE DECISION AIDING SYSTEMS TO COMPUTER ASSISTED INSTRUCTION: ADAPTIVE COMPUTERIZED TRAINING SYSTEM (ACTS) Technical Report, 1 Jan. - 30 Nov. 1976
William H. Crooks, Michael A. Kuppin, and Amos Freedy Jun. 1978 51 p refs

(Contract DAHC19-76-C-0019)
(AD-A056900; ARI-TR-78-A6) Avail: NTIS HC A04/MF A01 CSCL 05/9

This report describes the Adaptive Computerized Training System (ACTS) which combines the techniques of circuit simulation, artificial intelligence, decision modeling, and adaptive computer-assisted instruction to provide training in decision making. The ACTS incorporates an adaptive computer program which learns a student's value structure and uses this structure to train the student in practical decision making. This report describes the development and operation of the ACTS as it is applied to training electronics troubleshooting. Experimental evaluations have demonstrated that the adaptive decision model accurately models a student's performance, and that adaptively-selected instructions and decision feedback can improve trouble-shooting performance. Author (GRA)

N78-33798# California Univ., Berkeley. Inst. of Marine Resources.

FOUR FORTRAN PROGRAMS FOR NUMERICALLY SOLVING HELMHOLTZ'S EQUATION IN AN ARBITRARY BOUNDED PLANAR REGION

Wlodzimierz Proskurowski Feb. 1978 112 p refs Presented at Conf. of Math. Software, Austin, Tex.
(Contract W-7405-eng-48)
(LBL-7516; Conf-780331-2) Avail: NTIS HC A06/MF A01

A collection of four FORTRAN programs is presented: HLMHLZ is an implicit solver, recommended for use when only one problem is to be solved or the amount of available core storage is limited; HELMIT is an explicit solver for general use when the same problem is to be solved with different functions f; HELSIX is a high-order explicit Poisson solver (with Dirichlet conditions only); HELSYM is an explicit solver for use in solving eigenvalue problems (with zero Dirichlet conditions) only. These programs are limited to two-dimensional regions. ERA

N78-33799# California Univ., Livermore. Lawrence Livermore Lab.

DATA DIRECTOR RTOS MANUAL

D. N. Butner and P. R. McGoldrick 16 Mar. 1978 168 p
(Contract W-7405-eng-48)
(UCID-17750) Avail: NTIS HC A08/MF A01

The Data Director is a multi-user timesharing computer system which allows file manipulation (i.e. editing, printing, punching, etc.) and file transport between it and the OCTOPUS computer system. The heart of the Data Director is an Interdata 7/16 HSALU minicomputer with a 10-megabyte disk. Data Director users use 9600-baud CRT terminals to interact with the Data Director. The main purposes of the Data Director are to provide a fast, stable, and reliable system for editing and to provide remote punching of files. ERA

N78-33800# Sandia Labs., Albuquerque, N. Mex.

TECHNIQUES FOR DIGITAL DATA TRANSFORMATION AND MONITORING

1978 6 p refs Presented at the Natl. Aerospace and Electron. Conf., Dayton, Ohio, 16 May 1978
(Contract EY-76-C-04-0789)
(SAND-77-1604C; Conf-780525-2) Avail: NTIS HC A02/MF A01

Techniques for transformation of digital data patterns and for monitoring digital data patterns are of interest because of a variety of related problems. These include the following: code-storage devices often must be monitored to verify the presence of a correct code without making the code available to surreptitious equipment listening to the monitoring process; when unique signals used in nuclear safety devices must be monitored for correctness, it is important to do so without storing the intelligence that could be used to generate the signals accidentally and features of digital data must sometimes be recognized for extraction or suppression. Linear transformations are applied to provide methods that are applicable to the above problems. ERA

N78-33801# California Univ., Los Angeles.

CAT: A COMPUTER CODE FOR THE AUTOMATED CONSTRUCTION OF FAULT TREES

G. E. Apostolakis, S. L. Salem, and J. S. Wu Mar. 1978 264 p refs Sponsored by EPRI
(EPRI-NP-705) Avail: NTIS HC A12/MF A01

A computer code, CAT (Computer Automated Tree), is presented which applies decision table methods to model the behavior of components for systematic construction of fault trees. The decision tables for some commonly encountered mechanical and electrical components are developed; two nuclear subsystems, a Containment Spray Recirculation System and a Consequence Limiting Control System, are analyzed to demonstrate the applications of CAT code. ERA

N78-33802# Bureau of Labor Statistics, Washington, D. C. Div. of General Systems.

TABLE PRODUCING LANGUAGE SYSTEMS INSTALLATION INSTRUCTIONS, VERSION 4.0

Rudolph C. Mendelssohn Feb. 1978 71 p 4 Vol.
(PB-281376/4; BLS/DF-78-001A) Avail: NTIS HC A04/MF A01 CSCL 09B

Table Producing Language (TPL) is a computer system designed to select, restructure, crosstabulate, and display statistical data. The system was designed to solve some problems connected with the collection of large volumes of data from which cross tabulations must be produced in a wide variety of formats. The economist, statistician, social scientist, or other subject matter analyst need not be dependent on a separate computer program for each table requested. The syntax of the language allows the user to construct expressions representing the desired tables and auxiliary operations. The expressions allow the specification of complex data reduction, cross tabulation, and table generation operations. GRA

N78-33803# Bureau of Labor Statistics, Washington, D. C. Div. of General Systems.

PRINT CONTROL LANGUAGE, VERSION 4.0: USERS GUIDE

Rudolph C. Mendelssohn Feb. 1978 145 p 4 Vol.
(PB-281377/2; BLS/DF-78/001c) Avail: NTIS HC A07/MF A01 CSCL 09B

Print Control Language (PCL) is used to alter the appearance of the tables during a table generation run or after the cell data have been aggregated and saved. The PCL allows the user, by means of descriptive keywords, to reference and alter any number of tables. Within a table, the wafer, stub, and heading titles may be relabeled; empty rows may be deleted; column widths of varying sizes may be specified; and footnotes may be added. Individual cell data can be displayed with dollar signs, decimal points, cents or percent symbols. Cell data may be displayed together with text and/or a footnote number. The PCL system is designed to simplify and expedite the publication of tables. GRA

N78-33804# Bureau of Labor Statistics, Washington, D. C. Div. of General Systems.

TABLE PRODUCING LANGUAGES, VERSION 4.0: USERS GUIDE. INCLUDING CODEBOOK LANGUAGE

Rudolph C. Mendelssohn Feb. 1978 253 p 4 Vol.
(PB-281378/0; BLS/DF-78/001b) Avail: NTIS HC A12/MF A01 CSCL 09B

Table Producing Language is a computer system designed to select, restructure, crosstabulate and display statistical data. Problems connected with the collection of large volumes of data from which cross tabulations must be produced in a wide variety of formats are solved. The users' manual for the system is presented. GRA

N78-33805# Bureau of Labor Statistics, Washington, D. C. Div. of General Systems.

THE DEVELOPMENT AND USES OF TABLE PRODUCING LANGUAGE Final Report

Rudolph C. Mendelssohn Feb. 1978 25 p refs 4 Vol.
(PB-281379/8; BLS-515; BLS/DF-78/001d) Avail: NTIS HC A02/MF A01 CSCL 09B

The Table Producing Language designed and implemented as a general tool for producing statistical tables is presented. The syntax of the language allows the user to construct expressions representing the desired tables and auxiliary operations. The expressions are problem oriented, nonprocedural, compact, and

written with English-like nomenclature. They allow the specification of complex data reduction, cross tabulation, and table generation operations. Users need not be computer oriented.
GRA

N78-33806# National Technical Information Service, Springfield, Va.
STRUCTURED PROGRAMMING. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jun. 1978
George W. Reimherr Jul. 1978 187 p Supersedes NTIS/PS-77/0632; NTIS/PS-76/0551; NTIS/PS-75/501
(NTIS/PS-78/0688/8; NTIS/PS-77/0632; NTIS/PS-76/0551; NTIS/PS-75/501) Avail: NTIS HC $28.00/MF $28.00 CSCL 09B

The bibliography cites 181 studies on structured programming, including experiments and demonstrations of structured versus unstructured programming. Programming languages and specifications for structured programming are included. Its use in producing quality software systems and reducing problems is also discussed.
GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N78-33807 California Univ., Berkeley.
INPUT-OUTPUT STABILITY THEORY OF INTERCONNECTED SYSTEMS Ph.D. Thesis
Wan Sein Chan 1977 128 p
Avail: Univ. Microfilms Order No. 78-12514

The input-output stability theory of an arbitrary interconnection of multi-input subsystems is studied for three types of dynamics; nonlinear time-varying, linear time-invariant distributed and linear time-invariant lumped. The eigenvalue assignment and the stabilization of a standard state space system description of the overall system using local constant state feedbacks and local dynamic output feedbacks at two structural levels is also studied. It is shown that for arbitrary eigenvalue assignment a higher structural level feedback is required than for stabilization.
Dissert. Abstr.

N78-33808 Maryland Univ., College Park.
INTERACTIVE ELECTRONIC CIRCUIT SIMULATION ON SMALL COMPUTER SYSTEMS WITH A REAL TIME ALGORITHM FOR ac ANALYSIS Ph.D. Thesis
Brian Lee Biehl 1977 229 p
Avail: Univ. Microfilms Order No. 7814995

The feasibility of using small computer systems for interactive electronic circuit simulation is determined. Both the programmable desktop calculator and the minicomputer systems are included. In determining this feasibility, several aspects of the simulator architecture are considered; the computer language, the data word format, the computing speed, and computer memory configuration. Interactive circuit simulation on programmable desktop calculators is investigated. Interactive mode and batch mode circuit simulation on minicomputers is compared relative to the simulator architecture and required simulation speed. A new method for computing small-signal frequency response is introduced. Results indicate that successful interactive ac, dc and transient circuit simulation is possible on all the minicomputers considered, provided the proper system hardware and software are chosen.
Dissert. Abstr.

N78-33809 Duke Univ., Durham, N. C.
OPTIMAL BRANCHING PROBABILITIES AND THEIR RELATIONSHIP TO COMPUTER NETWORK FILE DISTRIBUTION Ph.D. Thesis
Lawrence Wilson Dowdy 1977 173 p
Avail: Univ. Microfilms Order No. 785664

A performance measure, network throughput, is defined for general topological computer networks. Four parameters characterize the network throughput: namely, the number of network nodes, the service speeds at each node, the average degree of multiprogramming and the branching probabilities between network nodes. Optimization of the network is accomplished by maximizing network throughput with respect to the branching probabilities. The remaining parameters are assumed to be fixed and given. A nonlinear programming technique, the Fletcher-Reeves method, is implemented to find the optimal branching probabilities. One critical network design problem which directly affects the branching probabilities is the file assignment problem. The problem of the physical location, among the network nodes, of the files which optimize the performance measure is determined. Alternate algorithms for the computation of the normalization constant for certain closed queuing networks are presented.
Dissert. Abstr.

N78-33810 Rice Univ., Houston, Tex.
HARDWARE SCHEDULING STRATEGIES FOR SYSTEMS WITH MANY PROCESSORS Ph.D. Thesis
William Lamar Bain, Jr. 1978 185 p
Avail: Univ. Microfilms Order No. 7814743

Hardware mechanisms are presented for the scheduling of a large number of processors and analysis techniques for comparing their performance. The processors are organized into a special purpose multiprocessing system connected by two data channels to a general purpose central processor. The central processor formulates fully independent tasks and delivers them to the system over one channel as a single stream of input packets. These packets are routed to arbitrary processors through an interconnection network containing zero or more buffers. The processors execute the tasks and output results as output packets which are routed to the second channel for return to the central processor in another stream. The performance analysis shows that systems with N processors and one buffer per processor achieve very nearly the ideal N-fold improvement in throughput over that for systems with one processor, since the use of buffering allows multiple processors to be concurrently scheduled.
Dissert. Abstr.

N78-33811 State Univ. of New York at Buffalo.
MEASURES OF CONGESTION FOR COMPUTER COMMUNICATION NETWORKS Ph.D. Thesis
Carol Ann Niznik 1978 187 p
Avail: Univ. Microfilms Order No. 78-17067

The problem in computer communication networks which is most difficult to solve is the reduction in throughput, reliability, quality of operation, and survivability due to local and global congestion. A number of general analytical measures which can be implemented in congestion control schemes for different topological network configurations is determined. The delay measures developed are couched on the disciplines of queueing theory, advanced theory of stochastic processes, probabilistic automata, and graph theory. Application of the measures is demonstrated on three topologies, a single node, two nodes in tandem, and a hierarchical network. User throughput, an end to end path delay measure, is directly influenced by these measures. A congestion-capacity product measure for a section of the network or an entire network is derived to show the existence of a constant relation between these two parameters. The two optimization techniques, i.e., a bounded optimization and a hierarchical optimization, minimize the congestion measure delay by optimal capacity assignment.
Dissert. Abstr.

N78-33812# Massachusetts Inst. of Tech., Cambridge. Electronic Systems Lab.
A LOWER BOUND TO PROTOCOL INFORMATION IN DATA NETWORKS M.S. Thesis
Charles Edward Rohrs Jun. 1978 58 p refs
(Contract N00014-64-C-1183; ARPA Order 3045)
(AD-A056345; ESL-TH-825) Avail: NTIS HC A04/MF A01 CSCL 17/2

Data communication networks transmit much information besides the actual user's messages. This 'extra' information is called protocol information. This thesis extends Gallager's initial work in providing an information-theoretic lower bound to how much of this protocol information is absolutely necessary for the proper operation of a network. The lower bound is a function of the average amount of time messages are allowed to be delayed before being transmitted. The bound suggests that the strategies considered by Gallager are close to optimal.
GRA

N78-33813# Naval Underwater Systems Center, New London, Conn.

REFERENCE BIBLIOGRAPHY ON OPERATING SYSTEM DESIGN ISSUES FOR DISTRIBUTED SYSTEMS (FIRST RELEASE)
Charles R. Arnold 3 Apr. 1978 68 p
(AD-A056560; NUSC-TM-781065) Avail: NTIS HC A03/MF A01 CSCL 09/2

This is a working draft of a future reference bibliography on distributed systems, their architecture and principally their controlling software known as an executive or operating system. The general operating systems literature pertaining to those issues which are considered most relevant for distributed systems (i.e., Communications and Synchronization, Protection, Fault-Tolerance, System Structuring Concepts, Programming and Control Languages) has also been included. Author (GRA)

N78-33814# Electronics Engineering Group (1842nd), Scott AFB, Ill.
DATA NETWORK REFEREE (DNR) CONCEPT REPORT
John F. Hynes 26 May 1978 64 p refs
(AD-A056960; Rept-1842-EEG/EETS-TR-78-2) Avail: NTIS HC A04/MF A01 CSCL 17/2

A concept is presented for monitoring, detecting, and identifying faults and subsystem failures, on the functional level, in Data Communications Networks. A brief review is included of the operating conditions of some existing data comm systems. Author (GRA)

N78-33815# Sandia Labs., Albuquerque, N. Mex. Scientific Systems Software Div.
NOS OPERATING SYSTEM BASE FOR SANDIA'S SCIENTIFIC COMPUTER NETWORK
J. Scot Fishburn Mar. 1978 23 p
(Contract EY-76-C-04-0789)
(SAND-78-0132) Avail: NTIS HC A02/MF A01

The feasibility and cost of upgrading the scientific computer operating system (from SCOPE 3.3 to NOS) used at Sandia Laboratories, Albuquerque (SLA) are discussed. The advantages, disadvantages, software development requirements, and implementation plans are presented. ERA

N78-33816# Sandia Labs., Albuquerque, N. Mex. Computer Aided Design Div.
SALOGS DIGITAL LOGIC SIMULATOR
Glenn R. Case 1978 6 p refs Presented at IEEE Symp. on Circuits and Systems, New York, 17 May 1978
(Contract EY-76-C-04-0789)
(SAND-78-0390C; Conf-780518-2) Avail: NTIS HC A02/MF A01

SALOGS, Version 4, is the latest in a series of programs designed to simulate and test digital networks. The network description language, simulation control language, simulation algorithm, and method used for fault diagnosis are described. ERA

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N78-33817 North Carolina State Univ., Raleigh.
OPTIMAL JOINING POLICIES FOR A QUEUING SYSTEM HAVING PARALLEL CHANNELS Ph.D. Thesis
Edward Lamon Davis 1977 126 p
Avail: Univ. Microfilms Order No. 78-11565

The dynamic control of a service system consisting of two identical exponential servers each with its own queue is examined to determine optimal policies for the acceptance or rejection of arriving customers and assignment of customers to queues. Optimal decision policies are examined for customers seeking self and social optimization. The social optimization problem is formulated as a Markov Decision Process and we show for the finite and infinite horizon, discounted and nondiscounted criterion that a control limit rule is optimal. A toll is exhibited which forces a customer acting in his own behalf to behave in a socially optimal manner. Dissert. Abstr.

N78-33818 Catholic Univ. of America, Washington, D. C.
FEATURE EXTRACTION IN AN ADAPTIVE MULTICLASS PATTERN RECOGNITION SYSTEM Ph.D. Thesis
Robert Craig Olson 1978 141 p
Avail: Univ. Microfilms Order No. 7816877

The feature selection search procedure that was developed was derived from the general field of integer programming. The particular method that was used is based upon branch-and-bound procedure. The specific implementation applied an implicit enumeration algorithm. An optimal subset of features was selected when this algorithm was used. Only a limited number of feature subsets were examined explicitly, while the majority of the feature subsets were only implicitly examined or enumerated. The implicit enumeration algorithm was implemented in a system program, COMBO. The probability of misclassification achieved by COMBO was equal to or less than what had been achieved using other search procedures. In one case, COMBO achieved a lower probability of misclassification that had previously been obtained. Dissert Abstr.

N78-33819 Rice Univ., Houston, Tex.
A METHODOLOGY FOR NONLINEAR FEATURE EXTRACTION IN STATISTICAL PATTERN RECOGNITION Ph.D. Thesis
Alok Daya Sagar 1977 79 p
Avail: Univ. Microfilms Order No. 7814798

A methodology is developed for the design of an optimal nonlinear feature extraction map A, with its domain in n-dimensional real vector space and range in m-dimensional real vector space (m less than n), for a statistical pattern recognition system. This methodology is based on the assumption that the a priori probabilities for the pattern classes are known, that a set of labeled samples is provided, and that no more information than that which can be inferred from the a priori probabilities and the given samples is available. It is also assumed that the classification rule is Bayes, that is, it minimizes the overall loss Q in the feature space. To indicate the dependence of Q on the feature extraction map A, Q(A) is used. The optimal feature extractor is obtained by minimizing Q(A) over a suitable family of transformations A. Dissert. Abstr.

N78-33820# Naval Research Lab., Washington, D. C.
SOME FORMAL EFFECTS OF NONLINEARITIES IN OPTIMAL PERTURBATION CONTROL
Warren W. Willman 5 Oct. 1978 151 p refs Backup document for AIAA Synoptic scheduled for publication in Journal of Guidance and Control in Jan. - Feb. 1979
Avail: NTIS HC A08/MF A01

Optimal control laws are investigated for modifications of the standard linear-quadratic-Gaussian problem in which small cubic terms are added to the performance criterion and small quadratic terms to the dynamics and state measurements, including cross-terms between the state and noise variables (state-dependent noise). These modifications are related to higher-order terms in noise-induced perturbations for a more general type of control problem. A class of almost Gaussian state probability distributions and a dynamic programming approach are used to derive an approximation to the optimal control law which is formally accurate to first order in the modifications. This approximation can be computed by solving only initial-value systems or ordinary difference or differential equations, as in the unmodified standard case. When the measurement noise is state-dependent, the state-estimation equations have a random driving term containing the scatter matrix of the measurements, which imposes some additional complications in the formulation of continuous-time problems. Numerical results are shown for a simple homing missile application. Author

N78-33821# Maryland Univ., College Park. Computer Science Center.
ALGORITHMS AND HARDWARE TECHNOLOGY FOR IMAGE RECOGNITION Final Report, 1 May 1976 - 31 Jan. 1978
David L. Milgram, Azriel Rosenfeld, Thomas Willett, and Glenn TisDale 31 Mar. 1978 292 p refs Prepared in cooperation with Westinghouse Defense and Electronics Systems Center, Baltimore

(Contract DAAG53-76-C-0138; DARPA Order 3206)
(AD-A057191) Avail: NTIS HC A13/MF A01 CSCL 09/2

Algorithms for detecting and classifying targets on forward-looking infrared (FLIR) imagery have been developed. The implementability of these algorithms in charge-coupled device (CCD) technology has been investigated, and one basic function, sorting, has been successfully implemented. The recommended algorithms had a detection rate above 95% and a false alarm rate of 1 to 2 per frame. Author (GRA)

N78-33822# Massachusetts Inst. of Tech., Cambridge. Electronic Systems Lab.

ADAPTIVE STOCHASTIC CONTROL OF LINEAR SYSTEMS WITH RANDOM PARAMETERS Ph.D. Thesis

Richard Tse-min Ku May 1978 236 p refs
(Grants AF-AFOSR-3281-77; NSF SOC-76-05827)
(AD-A056849; ESL-TH-820) Avail: NTIS HC A11/MF A01 CSCL 12/1

This thesis investigates the adaptive stochastic control of linear dynamic systems with purely random parameters. Hence there is no posterior learning about the system parameters. The control law is non-dual; still it has the qualitative properties of an adaptive control law. In the perfect measurement case, the control law is modulated by the priori level of uncertainty of the system parameters. Optimal stochastic control of dynamic systems with uncertain parameters has certain limitations. For the linear-quadratic optimal problem, the infinite horizon solution does not exist if the parameter uncertainty exceeds a certain quantifiable threshold. By considering the discounted cost problem, we have obtained some results on optimality versus stability for this class of stochastic control problems. For the noisy sensor measurement case the optimal fixed structure estimator-controller is obtained. The control law requires the solution of a coupled nonlinear two-point boundary value problem. Computer simulations of the forward and backward difference equations provided some insight into the uncertainty threshold for the closed loop system. GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N78-33823 Carnegie-Mellon Univ., Pittsburgh, Pa.

A FINITE ELEMENT METHOD FOR PROBLEMS INVOLVING THE HELMHOLTZ EQUATION IN TWO DIMENSIONAL EXTERIOR REGIONS Ph.D. Thesis

Samuel Paul Marin 1978 110 p
Avail: Univ. Microfilms Order No. 7812165

A nonlocal boundary condition is developed which allows problems involving the Helmholtz equation on exterior regions to be reduced to boundary value problems on annular subregions. A variational formulation of the reduced problem is constructed and the finite element method is implemented. Error estimates are proved which establish that the finite element approximations converge to the true solution with optimal convergence rates. An efficient numerical procedure for imposing the nonlocal condition is described. Results of numerical experiments are reported and the observed convergence rates are in agreement with those predicted by the theory. Dissert. Abstr.

N78-33824 Ohio Univ., Athens.

A MATHEMATICAL STRUCTURE Ph.D. Thesis

Michael David Konrad 1978 72 p
Avail: Univ. Microfilms Order No. 7812000

Given a set B and an ordinal-valued function N, the first part is a set F, the elements of which bear a striking resemblance to trees whose leaves are elements of B and whose limbs form branches about nodes the type of which is determined by N. For each u in the domain of N, a node of type u in a tree is formed by the junction of N(u) limbs. The structure is developed in the language of Zermelo-Fraenkel Set Theory. A property phi having two free variables is considered. Elements of its domain are called phi-structures, and corresponding elements of the range are called base sets. Fix an ordinal-valued function N. For such a formula phi the second part of the mathematical structure presents conditions on phi-structure inducers which suffice to guarantee that any phi-structure whose base set is B can be uniformly extended to a phi-structure on the set F corresponding to the set B. The implications of this mathematical structure are developed in a universal algebra setting. Dissert. Abstr.

N78-33825 Vanderbilt Univ., Nashville, Tenn.

AUTOMORPHISM GROUPS OF FREE ALGEBRAS AND DIRECT POWERS Ph.D. Thesis

Helen Marie Hutcheson James 1977 51 p
Avail: Univ. Microfilms Order No. 7812420

The characterization of the automorphism groups of algebraic systems and the endomorphism monoids of direct powers of universal algebras are examined. Results include: (1) any group having an element of order 2 is representable as the automorphism group of the direct square of some universal algebra; (2) any group which retracts onto S sub n is isomorphic to the automorphism group of the nth direct power of some universal algebra; (3) automorphism groups of free algebras with a basis of elements are exactly those groups which are the automorphism groups of nth direct powers; (4) automorphism groups of free algebras with a basis on n elements are exactly those groups which are the automorphism groups of nth direct powers; (5) automorphism groups of finite multiunary free algebras with bases on n elements all retract onto S sub n. Because the endomorphism monoids of free algebras on n generators are the anti-isomorphs of the endomorphism monoids of the nth direct powers, it is immediate that the cardinality of any of the latter monoids is m if and only if $m=1$ or $m=k(n)$, for all cardinals k greater than or equal to n. Dissert. Abstr.

N78-33826 California Univ., Berkeley.

DYNAMIC ADI METHODS FOR ELLIPTIC EQUATIONS WITH GRADIENT DEPENDENT COEFFICIENTS Ph.D. Thesis

Said Kamel Doss 1977 119 p
Avail: Univ. Microfilms Order No. 78-12544

The dynamic alternating direction implicit (DADI) methods, are applied also to eliptic problems with nonlinear gradient dependent coefficients such as: (1) the minimal surface equation; (2) the capillary surface equation; and (3) the magnetostatic equations. Certain improvements of these methods are developed and extended to three dimensional situations. Dissert. Abstr.

N78-33827 Michigan Univ., Ann Arbor.

A DISCRETE ORDINATES SOLUTION OF THE TIME-DEPENDENT FOKKER-PLANCK EQUATION Ph.D. Thesis

Thomas Alan Mehlhorn 1978 177 p
Avail: Univ. Microfilms Order No. 78-13701

A discrete ordinates computer code, TIMEX-FP, was developed to solve the time-dependent, one-dimensional (planar and spherical) Fokker-Planck equation in r, mu, v phase space. A complete and consistent treatment of the Fokker-Planck collision term, including the velocity drag and diffusion and angular dispersion terms, was combined with an existing discrete ordinates algorithm (TIMEX). The velocity and angular dependent collision terms were independently differenced and verified in an attempt to thoroughly document the accuracy of the TIMEX-FP program. A pointwise discrete energy formulation of the Fokker-Planck collision term was employed on a mesh determined by a repetitive three point Gaussian quadrature formula. An 18 group, S4, 20 spatial point, benchmark calculation of the deposition of 3.5 MeV alpha particle energy to ions and electrons per zone is presented. Dissert. Abstr.

N78-33828 Minnesota Univ., Minneapolis.

OPTIMAL REGULATION OF NONLINEAR SYSTEMS BY METHODS OF TENSOR ALGEBRA Ph.D. Thesis

Milorad Radomir Buric 1978 248 p
Avail: Univ. Microfilms Order No. 78-13384

The optimal regulation problem for a class of nonlinear nonautonomous dynamic systems is explicitly solved. The main contribution is in applying tensor algebra for obtaining optimal feedback controllers by exploiting inherent algebraic properties of multivariable polynomials that are used for a system description. As a result of such an approach, an optimal feedback controller is synthesized by means of algebraic operations performed on tensor coefficients which describe a nonlinear system. Hence

this is a generalization of the optimal feedback control theory for linear systems. Dissert. Abstr.

N78-33829 California Univ., Berkeley.
THE APPROXIMATION OF PLANE CURVES BY MEANS OF CIRCULAR-ARC-BASED ELEMENTS Ph.D. Thesis
Cristopher Delp Johnson 1977 170 p
Avail: Univ. Microfilms Order No. 78-12623

An approximation method in which a circular-arc-based approximating element is explored. A definition for the error of approximation of the element is proposed which is such that the size of the error can always be upper bounded for any plane curve segment and its best approximation. The numerical value of the bound may be approximately calculated using only integer arithmetic so that its use in minicomputer type processing systems is feasible. An algorithm is presented. Results of the method's application to some sample plane curves are presented. The method's performance is examined with respect to its use as a technique for the efficient encoding of plane curves. The method also is used as a technique for the smoothing of noisy plane curves. Dissert. Abstr.

N78-33830 California Univ., Berkeley.
GENERAL CONVERGENCE THEOREMS: THEIR RELATIONSHIPS AND APPLICATIONS Ph.D. Thesis
Suriyan TishyAdhigama 1977 142 p
Avail: Univ. Microfilms Order No. 78-12799

Some relationships among a number convergence theorems due to Polyak, Zangwill, Polak, G. Meyer, and R. Meyer are established. A basic algorithm model is introduced and a concept of convergence is defined. A new algorithm model for algorithms with antijamming schemes is developed. Three algorithm models are proposed for implementable conjugate gradient methods. Two of these algorithm models are used for convergence analysis of the so-called continued methods, while the remaining one is used for the restarted methods. For restarted methods, a new unified approach for proving n-step Q-quadratic convergence is developed. Dissert. Abstr.

N78-33831 Oregon State Univ., Corvallis.
FUNCTIONAL EXPANSIONS IN BILINEAR SYSTEM ANALYSIS Ph.D. Thesis
Veerabhadra Rao Karanam 1978 111 p
Avail: Univ. Microfilms Order No. 7811987

The Volterra series approach and the Walsh-function approach to bilinear analysis are examined. The Volterra series is developed by means of the Reversion technique. The uniform convergence of the series is proved and estimates on the bound of the output of the system and on the error due to the truncation of the series are obtained. A finite orthonormal set of functions is used in the expansion of input/output functions for parameter estimation and input/parameter functions for output computation of deterministic systems. Walsh functions form the basis of the expansions as a consequence of their group properties with respect to binary algebra and of their relationship with the integrals of Walsh functions. This method is applicable to time-variant bilinear systems and to systems with polynomial type nonlinearities. The effectiveness of the method for parameter estimation of deterministic systems subject to modeling and measurement noise is examined. Computational examples are presented to demonstrate the accuracy of the method. Dissert. Abstr.

N78-33832 Rice Univ., Houston, Tex.
AN EXTENSION OF NEWTON'S METHOD TO SYSTEMS OF EQUATIONS AND INEQUALITIES Ph.D. Thesis
Kathie Judd Hiebert 1978 87 p
Avail: Univ. Microfilms Order No. 7814765

A right inverse extension of Newton's method which can be used to find a feasible point to a system of equations and inequalities is presented. The method uses a right inverse of the Jacobian instead of the inverse of the Jacobian in the Newton step. Under certain conditions on continuity of the functions and boundedness of the right inverse, the method is R-quadratically convergent. The choice of which right inverse is based on the theory for systems of linear inequalities by Fan and the use of nonnegative slack variables. An algorithm was developed which chooses a right inverse which solves a consistent linear problem in one step, and demonstrates quadratic convergence for nonlinear systems. Dissert. Abstr.

N78-33833 George Washington Univ., Washington, D. C.
EVALUATING STRATEGIES FOR NEWTON'S METHOD USING A NUMERICALLY STABLE GENERALIZED INVERSE ALGORITHM Ph.D. Thesis
Gholamreza Emami 1978 225 p
Avail: Univ. Microfilms Order No. 78-15209

The Newtonian method used in obtaining the solution of nonlinear programming problems is examined. The method's desirable theoretical properties are weighed against the numerical difficulties in its implementation. Modifications of Newton's method are studied and its shortcomings pointed out. A numerically stable matrix factorization is given for obtaining the generalized inverse of the Hessian matrix when it is given in dyadic form. This factorization is used to obtain an estimate of the positive part of the Hessian matrix and a direction of nonpositive curvature. Three different strategies of the modified Newton method were interfaced with the computer program SUMT, which transforms the constrained minimization problem into a sequence of unconstrained problems. Numerical evaluations of these three methods are given and the computational results are tabulated and analyzed. Dissert. Abstr.

N78-33834 Rochester Univ., N. Y.
SEQUENTIAL LEAST SQUARES ESTIMATION OF SLOWLY TIME-VARYING PARAMETERS Ph.D. Thesis
Sankaran Narayana Murthy 1978 168 p
Avail: Univ. Microfilms Order No. 7815296

A modified least squares algorithm was derived for tracking slowly time-varying linear regression parameters. The modification consists in weighting the outer products of the input signal and the cross-products between the input signal and the observation in the past by an exponentially decreasing matrix averaging sequence. The proposed algorithm is sequential in that at each time instant, the estimates of the parameters are updated by using only the current value of the input signal and observation. A reasonable approximation of the proposed algorithm leads to a constant gain, predictive-error-correcting algorithm which is closely related to the Widrow-Hoff LMS algorithm. The analysis of the proposed algorithms is based on the assumption that the input signal has a stationary time-averaged outer product, but otherwise can be deterministic or stochastic, mutually correlated or not. Dissert. Abstr.

N78-33835# Naval Research Lab., Washington, D. C. Plasma Physics Div.
AN EFFICIENT DIRECT SOLVER FOR SEPARABLE AND NON-SEPARABLE ELLIPTIC EQUATIONS Interim Report
Rangarao V. Madala Mar. 1978 19 p refs
(RR0330341)
(AD-A056360; AD-E000175; NRL-MR-3668) Avail: NTIS HC A02/MF A01 CSCL 12/1

The basic error vector propagation method (EVP) for the solution of elliptic equations is described. Its advantages and limitations are compared to other direct solvers and iterative methods. A new technique called stabilized error vector propagation (SEVP) is presented. This method has most of the advantages of the EVP algorithm and, in addition, it is stable for all grid sizes. By solving Poisson's equation with Dirichlet boundary conditions, SEVP is found to be 3 to 10 times faster than competitive direct methods on a vector computer and requires an order of magnitude smaller computer memory. SEVP is at least 10 times faster than SOR. The efficiency of the SEVP method is found to increase for grids stretched in the marching direction while other methods tend to deteriorate under similar conditions. Author (GRA)

N78-33836# State Univ. of New York at Buffalo, Amherst. Statistical Science Div.
FORECASTING AND WHITENING FILTER ESTIMATION
Emanuel Parzen Jun. 1977 38 p refs
(Contract N00014-72-C-0508)
(AD-A056540; TR-54) Avail: NTIS HC A03/MF A01 CSCL 12/1

An approach to empirical time series analysis is described in which the identification stage is not accomplished chiefly by

graphical inspection of the time series and of computed auxiliary sample functions such as the autocorrelation function, partial autocorrelation function, and spectrum. Rather the transfer function g sub(infinity) of the whitening filter is directly estimated and parsimoniously parametrized. A criterion for choosing a regression model for forecasting is described. A model identification procedure for a stationary time series is described. Model identification for a non-stationary time series is discussed. Our approach is illustrated by an example. GRA

N78-33837# Decision Research Corp., Eugene, Oreg.
FAULT TREES: SENSITIVITY OF ESTIMATED FAILURE PROBABILITIES TO PROBLEM PRESENTATION
Baruch Fischhoff, Paul Slovic, and Sarah Lichtenstein Aug. 1977 56 p refs
(Contract N00014-76-C-0074; ARPA Order 3052)
(AD-A057163) Avail: NTIS HC A04/MF A01 CSCL 12/1

Fault trees represent problem situations by organizing things that could go wrong into functional categories. Such trees are essential devices for analyzing and evaluating the fallibility of complex systems. They follow many different formats, sometimes by design, other times inadvertently. Major results were: people were quite insensitive to what had been left out of a fault tree, increasing the amount of detail for the tree as a whole or just for some of its branches produced small effects on perceptions, and the perceived importance of a particular branch was increased by presenting it in pieces (as two separate component branches). Aside from their relevance for the study of problem solving, such results may have important implications for how best to inform the public about technological risks and to involve it in policy decisions and how experts should perform fault-tree analyses of the risks from technological systems. GRA

N78-33838# Ballistic Research Labs., Aberdeen Proving Ground, Md.
USER'S MANUAL FOR THE BRL SUBROUTINE TO CALCULATE BESSEL FUNCTIONS OF INTEGRAL ORDER AND COMPLEX ARGUMENT Final Report
Kathleen L. Zimmerman, Alexander S Elder, and Alene K. Depue May 1978 117 p
(DA Proj. 1L1-61102-AH-43)
(AD-A056369; AD-E430057; ARBRL-TR-02068) Avail: NTIS HC A06/MF A01 CSCL 12/1

The formulas used in the BRL Bessel Function subroutine are discussed in enough detail to enable the user to correctly implement the computer code. Accuracy limits for the Hankel Asymptotic Series are discussed in Appendix A. An annotated listing of the computer code and sample results are found in Appendix B and C. Author (GRA)

N78-33839# Stanford Linear Accelerator Center, Calif.
TOPICS IN COMPUTATIONAL GEOMETRY Ph.D. Thesis
John Edward Zolnowsky Feb. 1978 63 p refs
(Contract EY-76-C-03-0575)
(SLAC-206; STAN-CS-78-659) Avail: NTIS HC A04/MF A01

The behavior of the nearest-neighbor search algorithm based on the k-d tree data structure is characterized. If S is a finite set of points in Euclidean k-space, and p is a point in S, the nearest neighbor of p in S is a member of S, distinct from p which minimizes the distance from p. Bounds for the time for finding the nearest neighbor of all points are bound by use of the k-d data structure. Three different criteria for choosing the partition ordinate of each node in the k-d tree, based on the test point set are examined. The intersection of a finite set of half-spaces in three dimensions is constructed. If N is the number of half-spaces, the algorithm takes time proportional to N logN. The algorithm first constructs a northern and a southern cap, then intersects these two polyhedra to generate the result polyhedron. Space is vertically stratified into slabs by horizontal planes passed through the vertices of the caps. An edge of the final intersection can be found, and this edge is extended around the polyhedron to complete the insersection. ERA

N78-33840# Sandia Labs., Albuquerque, N. Mex. Advanced Systems Development Div.
HIGH-SPEED LOOKUP TABLE TECHNIQUE FOR DIGITAL MULTIPLICATION
James E. Simpson and Richard A. Wayne Mar. 1978 16 p
(SAND-77-1866) Avail: NTIS HC A02/MF A01

The development of a 12 bit, fixed-point tabular multiplier for use in real-time digital processing is discussed. Standard iterative multiplying processes are too slow, and hardware multiplying arrays which provide the required speed are too complex and have too many components. This tabular approach uses answer pointers and compressed answer tables which can be implemented with standard RAM or with special ROM-supported devices. This reduces the required digital hardware by at least half and thus improves the critical power budget, package size, and reliability of the signal processor. ERA

N78-33841# Sandia Labs., Albuquerque, N. Mex.
SHIFTED INCOMPLETE CHOLESKY FACTORIZATION
T. A. Manteuffel May 1978 79 p refs
(Contract EY-76-C-04-0789)
(SAND-78-8226) Avail: NTIS HC A05/MF A01

Large sparse linear systems that arise from the application of finite element methods can be solved using a technique which combines an incomplete factorization method called the shifted incomplete Cholesky factorization with the method of generalized conjugate gradients. The shifted Cholesky factorization produces a splitting of the matrix A that is dependent upon a parameter alpha. It is shown that, if A is positive definite, then there is some alpha for which this splitting is possible and that this splitting is at least as good as the Jacobi splitting. The method is shown to be more efficient on a set of test problems than either direct methods or explicit iteration schemes. ERA

N78-33842# Rochester Univ., N. Y. Production Automation Project.
CONSTRUCTIVE SOLID GEOMETRY
A. A. G. Requicha and H. B. Voelcker Nov. 1977 41 p refs
(Grants NSF GI-34274; NSF APR-76-01034)
(PB-281613/0; NSF/RA-770476; TM-25) Avail: NTIS HC A03/MF A01 CSCL 12A

The Notion of adding and subtracting solids was used by mechanical designers and others for generations, but attempts to embody it in computer-based modelling systems were hindered by the absence of a firm mathematical foundation. A foundation is provided by drawing on established results in modern axiomatic geometry and point set topology. A broader discussion is initiated, on three seminal topics: mathematical modelling of solids; representation of solids; and calculations of geometrical properties of solids. GRA

N78-33843# Rochester Univ., N. Y. Production Automation Project.
A STUDY OF GEOMETRIC SET-MEMBERSHIP CLASSIFICATION M.S. Thesis
Robert B. Tilove 1977 91 p refs
(Grants NSF GI-34274; NSF APR 76-01034)
(PB-281573/6; NSF/RA-770478; TM-30) Avail: NTIS HC A05/MF A01 CSCL 12A

The Membership Classification (MC) function and algorithms that evaluate MC in particular domains are considered. Problems such as: what knowledge about functions and objects in their domain and range is computationally useful; how can that knowledge be used to improve the behavior of algorithms that evaluate the function without impairing algorithm generally are studied. Various formal properties of the function are discussed. Algorithms that classify lines with respect to polygons are studied to gain insight into the interplay between the 'structure' of an MC algorithm, the manner in which the reference entity is represented, the worst case asymptotic time complexity of the algorithm, and 'special properties'. GRA

N78-33844# Rochester Univ., N. Y. Production Automation Project.
MATHEMATICAL MODELS OF RIGID SOLID OBJECTS
Aristides A. G. Requicha Nov. 1977 43 p refs
(Grants NSF GI-34274; NSF APR-76-01034)
(PB-281535/5; TM-28; NSF/RA-770477) Avail: NTIS HC A03/MF A01 CSCL 12A

A sharp mathematical characterization of 'rigid solids' in a manner that is suitable for studies in design and production automation is presented. Results in modern geometry and topology

scattered throughout the mathematical literature are placed in a coherent framework and presented in a form accessible to engineers and computer scientists. GRA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N78-33845 California Univ., Riverside.
INFORMATION THEORETIC METHODS FOR INDICATING THE SPEED OF CONVERGENCE AND APPROXIMATION ACCURACY OF DISTRIBUTIONS Ph.D. Thesis
Mervin Eugene Meyer 1978 107 p
Avail: Univ. Microfilms Order No. 7814064

The theory of a new and entirely different approach to the general problem of estimating the speed of convergence of a sequence of distributions is developed. This approach is based on the use of the mean discrimination information. However, if a sequence of discrete distributions converge to a continuous distribution, e.g., a sequence of distributions that satisfy the conditions of the Central Limit Theorem for lattice distributions, then the mean discrimination information cannot be used as proposed. As a solution to this problem, a new function that is in some ways similar to the mean discrimination is defined and studied in some detail. A number of examples are given illustrating the use of both of these functions as indices of the rate of convergence. Dissert. Abstr.

N78-33846 Carnegie-Mellon Univ., Pittsburgh, Pa.
CLUSTERING AND CLASSIFICATION OF DISCRETE DATA Ph.D. Thesis
David Chin-Che Wang 1978 159 p
Avail: Univ. Microfilms Order No. 7812161

Schemes for the clustering and classification of samples characterized by discrete-valued data are presented. The clustering scheme consists of a cluster initiation phase and a sample regrouping phase. The classification scheme can be organized into two subschemes. The first constitutes a distribution estimation based on the Bayes error probability minimax. The second is developed to further improve the classification results for two-class problems by first transforming the discrete feature space into a log likelihood ratio (LLR) space based on the proposed distribution estimation. Both schemes are tested and evaluated by using various sets of simulated and biomedical data. Their performances are compared with those of some existing methods. The results demonstrate the validity and operational feasibility of the proposed schemes and their superiority over the compared methods. Dissert. Abstr.

N78-33847 Polytechnic Inst. of New York.
BAYESIAN RELIABILITY ANALYSIS OF THE ALPHA DISTRIBUTIONS WITH APPLICATIONS Ph.D. Thesis
Dionysios Constantine Koutras 1978 247 p
Avail: Univ. Microfilms Order No. 7816754

Actual failure times of certain machine cutting tools proved to be best characterized by the Alpha Failure Model. The theory and applications of the Classical and Bayesian approach to life parameter and reliability estimation of the aforementioned failure distribution are examined. The maximum likelihood estimates for both shape and scale parameters were derived and were utilized on real life failure data. Bayesian and Pseudo Bayesian estimates for the shape parameter and reliability function were developed. The average mean square error (MSE) was employed in studying the robustness of the selected prior to characterizing the random behavior of the shape parameter of the proposed failure model. An extensive computer simulation procedure was employed to study the sensitivity of the Bayesian estimates. A Bayesian statistical inference approach to the system reliability estimation for a new vehicle is investigated. Dissert. Abstr.

N78-33848 Texas A&M Univ., College Station.
AN ANALYTIC STUDY OF A MINIMUM CHI-2-ESTIMATION PROCEDURE Ph.D. Thesis
Abdul Sattar Rashid Al-Khalidi 1978 70 p
Avail: Univ. Microfilms Order No. 7817162

Analytic properties are provided for special nonlinear estimation which arose in the analysis of earth resource technological satellite (ERTS) data. The estimation of crop proportions from observed multivariate frequencies of so-called channel intensities is considered. A variate transformation model was employed to estimate the crop proportions. The procedure is based on a transformation of a mixed distribution of crop signature into their known marginal distributions. The parameter estimates for the transformation were obtained simultaneously with the proportion of each crop type of interest on the land segment. It is shown that at every point of cumulation of the sequence of parameter vectors generated by the estimation procedure the Kuhn-Tucker conditions are satisfied. A sufficient condition for the existence of a unique point of the sequence of parameter vectors was provided. Dissert. Abstr.

N78-33849 Rice Univ., Houston, Tex.
AN ADAPTIVE ORTHOGONAL-SERIES ESTIMATOR FOR PROBABILITY DENSITY FUNCTIONS Ph.D. Thesis
G. Leigh Anderson 1978 66 p
Avail: Univ. Microfilms Order No. 7814739

Given a sample set X sub 1,...,X sub N of independent identically distributed real-valued random variables, each with the unknown probability density function f(.), the problem considered is to estimate f from the sample set. The function f is assumed to be in L sub 2(a,b); f is not assumed to be in any parametric family. An adaptive two-pass solution to the problem was constructed: In a pre-processing step (first pass), a preliminary rough estimate of f is obtained by means of a standard orthogonal-series estimator. In the second pass, the preliminary estimate is used to transform the orthogonal series. The new, transformed orthogonal series is then used to obtain the final estimate. Consistency of the estimator was established and asymptotic (large sample set) estimates of the bias and variance were derived. It is shown that the adaptive estimator offers reduced bias (better resolution) in comparison to the conventional orthogonal series estimator. Dissert. Abstr.

N78-33850 State Univ. of New York at Buffalo, Amherst.
AN INVESTIGATION OF A SPACE TIME CLUSTERING PROBLEM Ph.D. Thesis
Steven Ascher 1978 171 p
Avail: Univ. Microfilms Order No. 7817012

The properties of the statistic W are investigated. Various distributional properties of W obtained include exact formulas for the minimum, maximum, and range of W. The first four moments of W are derived and the algorithm used in the derivation is discussed. The exact formulas for the first four moments are listed. Exact formulas for the coefficients of skewness and kurtosis are obtained and limiting cases are discussed in an attempt to determine whether or not W is asymptotically more normal. The statistic W is compared with the Wilcoxon Rank Sum Test. The Pearson family of distributions is discussed. Pearson and normal distributions are fitted to W for n sub 1, n sub 2, and N. Tests of hypotheses based on Pearsonian fits of W, simulations of W, exact distributions of W, and normal tests are compared. Results are summarized. Dissert. Abstr.

N78-33851 Southern Methodist Univ., Dallas, Tex.
THE BAYESIAN MULTIPLE COMPARISONS PROBLEMS FOR UNIFORM DISTRUBUTIONS AND FOR TRANSLATED EXPONENTIAL DISTRIBUTIONS Ph.D. Thesis
James Edward Baird 1978 112 p
Avail: Univ. Microfilms Order No. 1815888

A Bayesian decision theoretic formulation was used for each of these problems. In this formulation each problem can be generated by a specified number of component problems. The loss structure in each case is such that the loss function for the overall problem is considered to be the sum of the loss functions for each component problem. Bayes rules are given for both problems. Also, a condition is given in each case which guarantees that only consistent decisions are made. A relationship between the two problems is discussed. Numerical results are presented which suggest a method of selecting a prior distribution when little information is known. A sensitivity study of the prior distribution is done, where sensitivity is determined as the ratio of average risk to minimum average risk. Dissert. Abstr.

N78-33852 Georgia Univ., Athens.
PROGRESSIVE CENSORING ON FOUR-PARAMETER WEIBULL DISTRIBUTION Ph.D. Thesis
Paul I-Po Hsieh 1978 150 p
Avail: Univ. Microfilms Order No. 78-14949

The theory and methodology required to estimate parameters for the four-parameter Weibull distribution when the sample data were progressively censored was investigated. Moment estimates derived from a reconstructed sample often serve as initial approximations for iteration of the final maximum likelihood or modified maximum likelihood estimates. Many special cases of the four-parameter Weibull distribution, such as the three-parameter gamma distribution, the three-parameter Weibull distribution and the exponential distribution were discussed. Asymptotic variance-covariance matrices of the maximum likelihood estimates were also given. A simulation was conducted to study the behavior of the estimates from maximum likelihood and modified maximum likelihood estimating techniques.
Dissert. Abstr.

N78-33853 Southern Methodist Univ., Dallas, Tex.
ROBUSTNESS OF THE MINQUE PROCEDURE IN ESTIMATING VARIANCE COMPONENTS PH.D. Thesis
Moon Yul Huh 1978 96 p
Avail: Univ. Microfilms Order No. 7815885

Consideration is given to the comparison of various quadratic variance component estimation procedures relative to the best quadratic unbiased estimation procedure for the two-way random model without interaction under normality. A quadratic biased estimator, the adjusted AUE, is developed. Utilizing some matrix operators defined within, concise expressions for the mean squared errors of the estimators are developed. Then the mean squared errors of the various types of estimators are investigated under the broad range of design configurations, parameter values and a-priori values.
Dissert. Abstr.

N78-33854 Yale Univ., New Haven, Conn.
AN ESTIMATION PROCEDURE FOR THE 3-PARAMETER WEIBULL DISTRIBUTION IN MODELING HYPERTENSION DATA Ph.D. Thesis
Robert Walter Makuch 1977 113 p
Avail: Univ. Microfilms Order No. 7816185

Models for the prevalence of hypertension were developed that provide a concise and interpretable characterization of age-specific prevalence curves. The 3 parameter Weibull distribution was investigated as a suitable model for describing blood pressure behavior and aspects of extreme value theory were invoked to describe the hypertension phenomenon. In fitting this distribution to data, difficulties in estimating parameters of this nonlinearizable function were handled via a general extension of a weighted least squares methodology. A measure of nonlinearity was proposed and utilized to denote the extent of nonlinearity associated with linearized forms of nonlinear models. Once developed, these analytic techniques were applied to prevalence data for hypersion compiled through a complex, multi-stage sample survey. After fitting the model, test statistics indicate that certain age, race, and sex interactions can be effectively characterized.
Dissert. Abstr.

N78-33855 Montana Univ., Missoula.
A GEOMETRICAL VIEW OF THE KOLMOGOROV-SMIRNOV STATISTICS WITH MULTI-SAMPLE GENERALIZATIONS Ph.D. Thesis
Dale Eugene Mueller 1978 204 p
Avail: Univ. Microfilms Order No. 7814691

The two sample Kilmogorov-Smirnov statistics were viewed through a geometric model. The model is used to motivate and unify some existing distributional results and it leads to some new distributional results based on correlated hypergeometric distributions. A FORTRAN subroutine is given to evaluate the null distributions of these statistics. Extensive tables are included which fill some substantial gaps in existing tables for the one sided version of the two sample statistic. The geometric model has a natural extension to three or more samples which is used to define a general sample statistic that depends on k parameters. An optimal choice of these parameters is found based on a certain desirable criterion. The two sample results based on correlated hypergeometric distributions were extended to results based on correlated multiple hypergeometric distributions.
Dissert. Abstr.

N78-33856 Southwestern Louisiana Univ., Lafayette.
A DECISION THEORY APPROACH TO INTERVAL ESTIMATION Ph.D. Thesis
Joey Harold Paul 1977 110 p
Avail: Univ. Microfilms Order No. 7809146

The problem of finding confidence intervals was considered where intervals are used in a general sense. A loss function was used so that the risk function is a linear combination of the expected size of the interval in standard units and the probability of error. Since the size is measured in standard units, the loss is invariant under groups of linear transformations of the sample space. If a pivotal quantity is available, the risk is minimized over the set of intervals generated by that pivotal quantity. This is accomplished for the mean and standard deviation of a normal population and tables are computed. If no pivotal quantity is available, the average (i.e., Bayes) risk is minimized. An interaction computer routine is presented which computes the Bayesian interval estimates for the parameters of the binomial, negative binomial, and Poisson distributions.
Dissert. Abstr.

N78-33857 Rochester Univ., N. Y.
A STUDY OF TWO-ARMED BANDITS Ph.D. Thesis
Peter Reimnitz 1978 152 p
Avail: Univ. Microfilms Order No. 7815302

A situation where a person has to perform a total of N trials where N is less than r equal to infinity is considered. Two experiments (populations) are available and each trial consist of drawing an observation from one of these populations. Let F sub 1 and F sub 2 be the corresponding distributions. In every pair (f sub 1, F sub 2) one of the two distributions is designed as being superior to the other. The experimenter does not know which of the two experiments is the superior one. It is his aim to minimize the expected number of drawings from the inferior population. The properties of the associated random walk are presented in some detail. The special situation where F sub 1 and F sub 2 are Bernoulli distributions with success probabilities is considered.
Dissert. Abstr.

N78-33858 Kentucky Univ., Lexington.
MAXIMUM MODIFIED LIKELIHOOD ESTIMATION OF POPULATION SIZE Ph.D. Thesis
Dan Aubrey Watson 1977 123 p
Avail: Univ. Microfilms Order No. 7815766

A discussion of previous work done on the problem of estimating an unknown population size is given. The family of maximum modified likelihood estimators (MMLE) is also introduced. The problem of estimating an unknown population size, N, where the elements of the population are censored is examined. A two-step sampling procedure is proposed as an improvement over the usual maximum likelihood and maximum modified likelihood procedures in a negative exponential distribution case.
Dissert. Abstr.

N78-33859 Michigan State Univ., East Lansing.
OPTIMAL CONTROL SYSTEM DESIGN: THE PREDICTIVE SAMPLING PROBLEM Ph.D. Thesis
Uhi Ahn 1978 115 p
Avail: Univ. Microfilms Order No. 7815084

The formulation and solution of the optimal predictive sampling criterion for a sampled-data control system and the development of the optimal control system design methodology for the optimal predictive sampling problem are described. The system performance index is formulated with a control performance index that measures actual performance of the control. The control performance index measures control performance over both the sampling interval over which the control is constant and a future interval where the control is permitted to be continuous. The results of the optimal adaptive sampled-data control with predictive sampling criterion shows that the optimal predictive sampling criterion is indeed adaptive for on-line control if performance can be precisely predicted as in the deterministic system but is periodic if future performance cannot be predicted as in the stochastic system.
Dissert. Abstr.

N78-33860# Brown Univ., Providence, R. I. Center for Dynamical Systems.
LARGE DEVIATIONS FOR DIFFUSIONS DEPENDING ON SMALL PARAMETERS: A STOCHASTIC CONTROL METHOD Interim Report
Wendell H. Fleming 1978 8 p refs
(Grants AF-AFOSR-3063-76; NSF MCS-76-07247; AF Proj. 2304)
(AD-A055652; AFOSR-78-1022TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper considers stochastic differential equations depending on a small parameter epsilon, which enters as a coefficient in the noise term of the equation. The Ventcel-Freidlin estimates give an asymptotic formula as epsilon approaches 0 for the probability that a solution trajectory hits a given compact set B during a given time interval. A stochastic control method to obtain such estimates is outlined. Detailed proofs are given elsewhere. Author (GRA)

N78-33861# State Univ. of New York at Buffalo, Amherst. Statistical Science Div.
A DENSITY-QUANTILE FUNCTION PERSPECTIVE ON ROBUST ESTIMATION
Emanuel Parzen Mar. 1978 44 p refs
(Grant DAAG29-76-G-0239)
(AD-A056707; ARO-13845.5-M) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper provides an overview to a new general approach to statistical data analysis and parameter estimation which could be called the quantile function approach. The aims of descriptive statistics (to graphically summarize and display the data) are obtained by Quantile-Box plots of the sample quantile function. The aims of goodness of fit are obtained by fitting smooth quantile functions to the sample quantile function. The aims of parameter estimation, especially robust estimation of location and scale parameters, are attained by regression analysis of the sample quantile function. (The goal of a statistician in analyzing a batch of data X1,...,Xn should be both estimation of parameters and goodness of fit. By 'goodness of fit' is meant fitting of the observed sample probabilities by a smooth probability law.) GRA

N78-33862# State Univ. of New York at Buffalo, Amherst. Statistical Science Div.
NEW NONPARAMETRIC APPROACH TO THE TWO SAMPLE PROBLEM
Jean-Pierre Carmichael and Emanuel Parzen Jul. 1977 53 p refs
(Grant DAAG29-76-G-0239)
(AD-A056706; TR-56; ARO-13845.4-M) Avail: NTIS HC A04/MF A01 CSCL 12/1

Following the unified approach one can reexamine the two-sample problem with emphasis on differences of location. Based on simulations the different classical parametric and non-parametric procedures are compared with some new test statistics. The use of the two-sample problem package is illustrated including new graphical procedures on some sets of data taken from the literature. GRA

N78-33863# State Univ. of New York at Buffalo, Amherst. Statistical Science Div.
TECHNIQUES OF QUANTILE REGRESSION
Jean-Pierre Carmichael Jun. 1978 27 p refs
(Grant DAAG29-76-G-0239)
(AD-A056705; ARO-13845.3-M) Avail: NTIS HC A03/MF A01 CSCL 12/1

The asymptotic properties of different nonparametric estimators of a regression function are studied. The motivation for these estimators comes from the unified approach to statistics developed by Parzen under the name of Nonparametric Statistical Data Science in which the quantile function plays a crucial role. We call them quantile regression estimators. GRA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N78-33864 Rochester Univ., N. Y.
THE MULTI-PRODUCT PRODUCTION CYCLING PROBLEM Ph.D. Thesis
Stephen Clyde Graves 1978 163 p
Avail: Univ. Microfilms Order No. 78-15277

The one-product problem is formulated and solved as a Markov decision problem. A conjecture is given that the optimal policy is a two-critical-number policy; theoretical and empirical evidence is presented to support this conjecture. An alternative formulation, based on queueing theory concepts, is also given. The multi-product problem may also be formulated as a Markov decision problem, but the formulation is too large to be solvable in practice. Heuristic decision procedures are proposed for various versions of the problem. These heuristics are based on the results of the one-product analysis, and on two key notions: the composite product and the lead-time adjustment. The heuristics are tested by means of simulation, and are shown to be effective relative to alternative heuristics and to cost bounds on the problem. Dissert. Abstr.

N78-33865 Rochester Univ., N. Y.
HIERARCHICAL ANALYSIS OF SYSTEMS Ph.D. Thesis
Henry Arthur Young 1978 398 p
Avail: Univ. Microfilms Order No. 78-15311

A general method is described for analyzing complex systems that usefully simplifies the problem of constructing closed-form mathematical models of their performance. This technique, named Hierarchical Analysis, sharply separates what a system does from how it does what it does. Starting with a functional description of the system and its mode of operation, the initial top level model of system performance interrelates only the most general, resource-independent variables that are descriptive of system outputs. Then, the generic variables in this extensive description of what the system does are intensively developed by treating each of these as the output of a lower-level model that more closely reflects the details of how the system functional capabilities are implemented specifically. Two short example analyses that provide the basis for a discussion of the method and its advantages, are presented along with substantial case studies that both illustrate the technique and provide substantive results about the systems analyzed that are of independent interest. Dissert. Abstr.

N78-33866 Pennsylvania Univ., Philadelphia.
PLANNING TELECOMMUNICATIONS SYSTEMS: A NORMATIVE APPROACH Ph.D. Thesis
Joao Lopes De Albuquerque Montenegro 1978 154 p
Avail: Univ. Microfilms Order No. 78-16336

A normative decision making framework is proposed for telecommunications systems planning. First, flexibility is defined as the management and engineering margins implemented in the systems to cope with the uncertainties of the systems requirements. The current decision making procedures are then shown to be contained within the decision making structure of decision analysis, which is enhanced to account for the increasingly important problems of flexibility in today's planning of telecommunications systems. The improvements brought by this structure include: (1) capability to incorporate the uncertainties of the systems requirements into the decision making process; (2) capability to define the systems margins in a consistent manner; (3) capability to account for the flexibility preferences of the decision maker; (4) capability of more meaningful comparisons of candidate alternatives; and (5) capability to define the overall system with the same level flexibility. Dissert. Abstr.

N78-33867 Kent State Univ., Ohio.
THE ZONAL MATCHING PROBLEM Ph.D. Thesis
Barbara Ann Dawson 1976 477 p
Avail: Univ. Microfilms Order No. 7811833

Unique algorithms using a generalization of the shortest alternating path technique are developed and proved to produce optimal solutions for the zonal matching problem in a bipartite graph and in a general graph. Both algorithms were programmed in ALGOL and computational experience was obtained by solving a series of randomly generated problems on a Burroughs 5500 computer. It was found that both algorithms exhibited slow stable growth rates. It was further discovered that the Bipartite algorithm appeared to be sensitive to the number of zones in a graph

while the General algorithm appeared to react more strongly to the variation in the size of the zones. The Bipartite algorithm was further tested on a real-world problem in Tanzania, Africa.
Dissert. Abstr.

N78-33868# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
PERFORMANCE ANALYSIS OF THE TECHNOLOGY CHESS PROGRAM Interim Report
James J. Gillogly Mar. 1978 87 p refs
(Contract F44620-73-C-0074; ARPA Order 2466)
(AD-A056072; CMU-CS-78-109; AFOSR-78-1092TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

Many Artificial Intelligence programs exhibit behavior that can be meaningfully compared against the performance of another system, e.g. against a human. A satisfactory understanding of such a program must include an analysis of the behavior of the program and the reasons for that behavior in terms of the program's structure. The primary goal of this thesis is to analyze carefully the performance of the Technology Chess Program as a paradigm for analysis of other complex AI performance programs. The analysis uses empirical, analytical, and statistical methods.
GRA

N78-33869# Texas Univ. at Austin. Center for Cybernetic Studies.
A NETWORK AUGMENTING PATH BASIC ALGORITHM FOR TRANSSHIPMENT PROBLEMS
Richard Barr, Joyce Elam, Fred Glover, and Darwin Klingman Mar. 1978 35 p refs Revised
(Contract N00014-75-C-0569; N00014-75-C-0616)
(AD-A056761; CCS-272) Avail: NTIS HC A03/MF A01 CSCL 05/1

The purpose of this paper is to present a new simplex algorithm for solving capacitated transshipment network problems which both circumvents and exploits the pervasive degeneracy in such problems. This generalized alternating path algorithm is based on the characterization of a special subset of the bases that are capable of leading to an optimal solution. With consideration restricted to these bases, fewer alternative representations of a given extreme point are inspected. The impact on the number of degenerate pivots and problem solution times is demonstrated by computational testing and comparison with other approaches.
Author (GRA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N78-33870# Minnesota Univ., Minneapolis. Dept. of Theoretical Statistics.
A NOTE ON ANCILLARITY AND INDEPENDENCE VIA MODEL-PRESERVING TRANSFORMATIONS
Somesh Das Gupta May 1978 12 p refs
(Grant DAAG29-76-G-0038)
(AD-A056344; UMN/DTS/TR-319; ARO-13149.6-M) Avail: NTIS HC A02/MF A01 CSCL 12/1

Let G be a compact group of transformations which preserves a family rho of probability measures. Let T be a statistic such that its space Tau is a G-space. If T is equivariant and G is transitive on Tau then T is ancillary for rho and distributed independently of a maximal G-invariant statistic T which also happens to be sufficient for rho. This result in then extended to a group G satisfying the Hunt-Stein Condition.
GRA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N78-33871 Carnegie-Mellon Univ., Pittsburgh, Pa.
STUDY OF ICE GROWTH IN SLIGHTLY UNDERCOOLED WATER Ph.D. Thesis
Tashashi Fujioka 1978 306 p
Avail: Univ. Microfilms Order No. 7815199

Ice crystals are grown from the tip of a very fine capillary tube whose orifice is centered in a glass bulb filled with highly purified water and surrounded by a carefully controlled thermal reservoir. Three morphologies of ice crystals are observed: ice discs, perturbed disc and dendrites. A mathematical model is developed for the growth of an ice disc. The actual thermal conductivities of ice and water are used and the theoretical result is compared with models in which the conductivity of ice is assumed to be infinite (the Mason theory) or the same as that of water (the identical conductivity theory or IC theory).
Dissert. Abstr.

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N78-33872 Rensselaer Polytechnic Inst., Troy, N. Y.
MATHEMATICAL ANALYSIS OF EFFECTS OF UNDERWATER SOUND-SOURCE MOTION ON RECEIVED TOTAL ACOUSTIC FIELD Ph.D. Thesis
Garry Mitchell Jacyna 1977 153 p
Avail: Univ. Microfilms Order No. 7811532

A mathematical analysis of the effects of underwater cw sound-source motion on the total received acoustic field is examined for both shallow and deep ocean environments. The results are extended to include a consideration of deep water broadband sound-source effects. Comparisons between stationary and moving cw and broadband sources are made and novel results are obtained.
Dissert. Abstr.

N78-33873*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPARISON OF LOW-FREQUENCY NOISE LEVELS OF THE CONCORDE SUPERSONIC TRANSPORT WITH OTHER COMMERCIAL SERVICE AIRPLANES
Clemans A. Powell and David A. McCurdy Oct. 1978 48 p refs
(NASA-TM-78736; L-12210) Avail. NTIS HC A03/MF A01 CSCL 20A

Fifty-two airplane noise recordings, made at several locations around Dulles International Airport, were analyzed to compare the low-frequency noise levels of the Concorde supersonic transport with those of other commercial jet airplanes. Comparisons of the relative low-frequency noise levels which were produced at close and distant locations for departures and arrivals were made for three noise measures: the sound pressure level in the 1/3 octave band centered at 20 Hz, the total sound pressure level in the 1/3 octave bands with center frequencies less than or equal to 125 Hz, and the total sound pressure level in the 1/3 octave bands with center frequencies less than or equal to 500 Hz. Although the absolute noise levels for Concorde were found, in general, to be higher than those for the other airplane types, the level of low-frequency noise of the Concorde relative to the perceived noise level (PNL), effective perceived noise level (EPNL), and overall sound pressure level (OASPL) was within the range established by the other airplane types, except for the arrival operations of four-engine, narrow-body airplanes. The measure OASPL was found to be a significantly better predictor of low-frequency noise level than PNL or EPNL.
Author

N78-33874*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NOISE-INDUCED BUILDING VIBRATIONS CAUSED BY CONCORDE AND CONVENTIONAL AIRCRAFT OPERATIONS AT DULLES AND KENNEDY INTERNATIONAL AIRPORTS Final Report
W. H. Mayes, D. G. Stephens, H. K. Holmes, R. B. Lewis, B. G. Holliday, D. W. Ward, R. DeLoach, J. M. Cawthorn, T. D. Finley, J. W. Lynch et al Aug. 1978 18 p refs Original contains color illustrations
(NASA-TM-78769) Avail: NTIS HC A02/MF A01 CSCL 20A

Outdoor and indoor noise levels resulting from aircraft flyovers and certain nonaircraft events were recorded, as were the associated vibration levels in the walls, windows, and floors at building test sites. In addition, limited subjective tests were conducted to examine the human detection and annoyance thresholds for building vibration and rattle caused by aircraft noise. Representative peak levels of aircraft noise-induced building vibrations are reported and comparisons are made with structural damage criteria and with vibration levels induced by common domestic events. In addition, results of a pilot study are reported which indicate the human detection threshold for noise-induced floor vibrations. G.G.

N78-33875*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IMPEDANCE MEASUREMENT USING A TWO-MICROPHONE, RANDOM-EXCITATION METHOD
A. F. Seybert (Kentucky Univ.) and T. L. Parrott Oct. 1978 40 p
(NASA-TM-78785) Avail: NTIS HC A03/MF A01 CSCL 20A

The feasibility of using a two-microphone, random-excitation technique for the measurement of acoustic impedance was studied. Equations were developed, including the effect of mean flow, which show that acoustic impedance is related to the pressure ratio and phase difference between two points in a duct carrying plane waves only. The impedances of a honeycomb ceramic specimen and a Helmholtz resonator were measured and compared with impedances obtained using the conventional standing-wave method. Agreement between the two methods was generally good. A sensitivity analysis was performed to pinpoint possible error sources and recommendations were made for future study. The two-microphone approach evaluated in this study appears to have some advantages over other impedance measuring techniques. G.G.

N78-33876*# Nielsen Engineering and Research, Inc., Mountain View, Calif.
PROPAGATION OF SOUND THROUGH A SHEARED FLOW Final Report, 30 Aug. 1976 - 1 Jul. 1977
James P. Wocliey, Charles A. Smith, and Krishnamurty Karamcheti Aug. 1978 83 p refs
(Contract NAS2-9357)
(NASA-CR-152196; NEAR-TR-171) Avail: NTIS HC A05/MF A01 CSCL 20A

Sound generated in a moving fluid must propagate through a shear layer in order to be measured by a fixed instrument. These propagation effects were evaluated for noise sources typically associated with single and co-flowing subsonic jets and for subcritical flow over airfoils in such jets. The techniques for describing acoustic propagation fall into two categories: geometric acoustics and wave acoustics. Geometric acoustics is most convenient and accurate for high frequency sound. In the frequency range of interest to the present study (greater than 150 Hz), the geometric acoustics approach was determined to be most useful and practical. G.G.

N78-33877# SACLANT ASW Research Center, La Spezia (Italy).
REVISED SIMPLIFIED FORMULAE FOR CALCULATING THE SPEED OF SOUND IN SEA WATER
Donald Ross 15 Mar. 1978 15 p refs
(AD-A056556; SACLANTCEN-SM-107) Avail: NTIS HC A02/MF A01 CSCL 20/1

A method of quantitatively determining size and location of flaws in anisotropic materials such as stainless steel welds is described. In an anisotropic structural material (stainless steel weld, centrifugal cost pipe), the velocity (both shear and longitudinal) is direction-dependent. When anisotropy is not taken into account, defect location and defect size estimation is misjudged. It will be shown that the effect of this structural variation in materials must be considered to obtain the correct size and location of defects by frequency analysis. A theoretical calculation, including anisotropy, of the scattered field from defects will also be presented. GRA

N78-33878# Tennessee Univ., Knoxville. Ultrasonics Lab.
RALEIGH-LIKE REFLECTION OF ULTRASONIC WAVES AT A LIQUID-SOLID LAYER-SOLID INTERFACE Interim Technical Report
Daniel A. McCathern, Jr. Jun. 1978 72 p refs
(Contract N00014-76-C-0177; N00014-71-A-0121-0001)
(AD-A056975; TR-16) Avail: NTIS HC A04/MF A01 CSCL 20/1

An ultrasonic beam in a liquid is incident upon a solid coated with a thin solid layer. At certain angles of incidence leaky surface waves are excited on the interface. These surface waves cause the reflected beam to be separated into two components: the specular component and a displaced component. A schlieren system is used to observe the two components and the null strip between them. The null strip is used as a measure of the angle of excitation of the surface waves, and hence as a measure of the surface wave velocity. The substrates studied were stainless steel, aluminum, lead, plexiglass, brass, glass, copper, and aluminum oxide. The layers were zirconium oxide, aluminum oxide, aluminum, brass, stainless steel, copper, and nickel. The behavior of the phase velocity of the Rayleigh-like waves is determined by the relationship between the layer and the substrate shear velocities. GRA

N78-33879# Undersea Resdarch Corp., Falls Church, Va.
AN ANALOG FFT BEAMFORMER FOR ACOUSTIC APPLICATIONS Final Report, 15 Feb. 1977 - 14 Apr. 1978
21 Mar. 1978 112 p refs
(Contract N00014-77-C-0494)
(AD-A057057) Avail: NTIS HC A06/MF A01 CSCL 20/1

An analog FFT beamformer has been designed, built and tested for one- and two-dimensional arrays. In addition, a focusing capability has been built and tested. The focusing system is used to remove the signal wavefront curvature due to close sources. This technology is applicable to a wide variety of array configurations, providing beamformers that are inexpensive, reliable, small, low power and have high data throughput rates. Author (GRA)

N78-33880# Oak Ridge National Lab., Tenn.
FLAW LOCATION AND CHARACTERIZATION IN ANISOTROPIC MATERIALS BY ULTRASONIC SPECTRAL ANALYSIS
L. Adler, K. V. Cook, W. A. Simpson, and D. K. Lewis (Tennessee Univ., Knoxville) 1978 10 p refs Presented at the Conf. of the Am. Soc. for Nondestructive Testing, New Orleans, 3 Apr. 1978
(Contract W-7405-eng-26)
(Conf-780427-1) Avail: NTIS HC A02/MF A01

A method of quantitatively determining size and location of flaws in anisotropic materials such as stainless steel welds is described. In an anisotropic structural material (stainless steel weld, centrifugal cast pipe), the velocity (both shear and longitudinal) is direction-dependent. When anisotropy is not taken into account, defect location and defect size estimation is misjudged. It will be shown that the effect of this structural variation in materials must be considered to obtain the correct size and location of defects by frequency analysis. A theoretical calculation, including anisotropy, of the scattered field from defects will also be presented. ERA

N78-33881# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY. PART 1: EXPLORATION, VOLUME 3. CITATIONS FROM NTIS DATA BASE Progress Report, May 1976 - Jul. 1978
Mona F. Smith Jul. 1978 180 p Supersedes NTIS/PS-77/0561
(NTIS/PS-78/0664/9; NTIS/PS-77/0561) Avail: NTIS HC $28.00/MF $28.00 CSCL 20A

The bibliography cites Federally-funded research on geophysical methods, such as electrical resistivity, seismology, magnetic anomaly, and electromagnetic measurements in geothermal site survey determination. Studies on well logging, remote sensing, geochemistry, mineralogy, radioactivity, mapping, volcanism, and structural geology are included. Criteria for location of geothermal areas are suggested in these abstracts. (This updated bibliography contains 174 abstracts, 72 of which are new entries to the previous edition.) GRA

N78-33882# National Technical Information Service, Springfield, Va.

GEOTHERMAL ENERGY. PART 2: CORROSION AND EQUIPMENT, VOLUME 3. CITATIONS FROM THE NTIS DATA BASE Progress Report, May 1976 - Jul. 1978
Mona F. Smith Jul. 1978 94 p Supersedes NTIS/PS-77/0562
(NTIS/PS-78/0665/6; NTIS/PS-77/0562) Avail: NTIS HC $28.00/MF $28.00 CSCL 20A

Citations of Government-sponsored research reports on corrosion and equipment studies related to geothermal energy are presented. Studies on pumps, turbines, drilling equipment, pipes, nozzles, and well casings are covered, along with studies on materials including concretes, steels, and nonferrous alloys. Silica precipitation and scale formation on equipment are also cited. Performance of equipment in working fluids and brines and the chemical processes affecting performance are included. (This updated bibliography contains 88 abstracts, 42 of which are new entries to the previous edition.) GRA

N78-33883# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY. PART 3: TECHNOLOGY AND GENERAL STUDIES, VOLUME 3. CITATIONS FROM THE NTIS DATA BASE Progress Report, May 1976 - Jul. 1978
Mona F. Smith Jul. 1978 333 p Supersedes NTIS/PS-77/0563
(NTIS/PS-78/0666/4; NTIS/PS-77/0563) Avail: NTIS HC $28.00/MF $28.00 CSCL 20A

This bibliography covers Government-sponsored research on geothermal energy conversion, power plants, heat extraction, space heating, and steam power plants. Studies on fluid flow, heat transfer, rock fracturing, computerized sumulation, pressure, and reservoir engineering are included. Reports on economics, legislation, technology assessment, comparative evaluation with other energy sources, Government policies, and planning are also cited. (This updated bibliography contains 326 abstracts, 153 of which are new entries to the previous edition.) GRA

N78-33884# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY, VOLUME 3. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1976 - Jul. 1978
Mona F. Smith Jul. 1978 330 p Supersedes NTIS/PS-77/0565; NTIS/PS-76/0465
(NTIS/PS-78/0667/2; NTIS/PS-77/0565; NTIS/PS-76/0465) Avail: NTIS HC $28.00/MF $28.00 CSCL 20A

Citations from worldwide literature on geothermal energy conversion, feasibility, development, and cost estimates are presented. Studies on geothermal exploration, drilling technology, fluid flow, convection, thermodynamics, heat extraction, and electric power plants are covered. Equipment, corrosion, reservoir engineering, and remote sensing are included. (This updated bibliography contains 323 abstracts, 150 of which are new entries to the previous edition.) GRA

N78-33885# National Technical Information Service, Springfield, Va.
ACOUSTIC HOLOGRAPHY. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - May 1978
William E. Reed Jul. 1978 148 p Supersedes NTIS/PS-77/0578; NTIS/PS-76/0440; NTIS/PS-75/432; Com-74-10871
(NTIS/PS-78/0700/1; NTIS/PS-77/0578; NTIS/PS-76/0440; NTIS/PS-75/432; COM-74-10871) Avail: NTIS HC $28.00/MF $28.00 CSCL 20A

Aspects of acoustic holography are covered in this bibliography of Federally-funded research. Theory, equipment design, uses, and imaging techniques are presented. The applications include underwater and underground object locating, structural geology and tectonics, sonar imaging, non-destructive testing, antenna radiation patterns, nuclear reactor inspection, remote sensing, and use in medical examinations. (This updated bibliography contains 142 abstracts, 17 of which are new entries to the previous edition.) GRA

N78-33886# National Technical Information Service, Springfield, Va.
ACOUSTIC HOLOGRAPHY. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - May 1978
William E. Reed Jul. 1978 249 p Supersedes NTIS/PS-77/0579; NTIS/PS-76/0441
(NTIS/PS-78/0701/9; NTIS/PS-77/0579; NTIS/PS-76/0441) Avail: NTIS HC $28.00/MF $28.00 CSCL 20A

Worldwide research on acoustic holography is covered. Theory, uses, equipment design, and imaging techniques are presented. Most of the studies are general and not applied to a specific use of acoustic holography. However, there are citations which do discuss its use in medicine, nuclear reactors, and nondestructive testing. (This updated bibliography contains 242 abstracts, 32 of which are new entries to the previous edition.) GRA

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N78-33887 Michigan Univ., Ann Arbor.
PARITY NONCONSERVATION IN THE HYDROGEN ATOM Ph.D. Thesis
Robert Walker Dunford 1978 188 p
Avail: Univ. Microfilms Order No. 7813642

Investigation of possible experiments to search for parity nonconserving neutral current interactions in atomic hydrogen has led to the formulation of an experiment involving a Stark induced microwave transition between the 2S sublevels alpha sub o and beta o of hydrogen. The experiment involves the measurement of an asymmetry of 2.5 x 10 to the -6 power C sub 2p in the rate, where C sub 2p is a constant which characterizes the axial vector proton-vector electron neutral weak coupling. A general method of formulating parity experiments in hydrogenic atoms was developed. The method involves the decomposition of the rates for various atomic processes in terms of invariants. The pseudoscalar terms in the decomposition indicate the possible parity experiments while the scalar terms can be used to analyze systematics. Dissert. Abstr.

N78-33888 Rice Univ., Houston, Tex.
EXPERIMENTAL STUDY OF RESONANT ELECTRON TRANSFER IN He (+) (+) He AND H (+) (+)H COLLISIONS AT LOW RELATIVE VELOCITIES Ph.D. Thesis
David Edwin Nitz 1978 133 p
Avail: Univ. Microfilms Order No. 7814786

The merging beams technique was employed to measure electron transfer cross sections for the reaction He(+) + He(1S) yields He(1S) + He(+) between 0.1 and 100 eV and for H(+) + H(1S) yields H(1S) + H(+) between 2 and 100 eV. The theory of resonant electron transfer collisions was summarized, with attention given to the effects of nuclear symmetry. The experimental technique is described in detail and the results of apparatus consistency tests are presented. The measured cross sections for the helium reaction confirm previous experimental and theoretical results. Preliminary results for the hydrogen cross sections exhibit considerable scatter and generally lie below previous results. Possible causes for the discrepancies are considered. Dissert. Abstr.

N78-33889 Rice Univ., Houston, Tex.
INTERACTIONS OF ATOMS WITH SOLID SURFACE: NONADIABATIC MECHANISM FOR THE PRODUCTION OF EXCITED STATE HYDROGEN AND HELIUM ATOMS AT A METAL SURFACE Ph.D. Thesis
Lawrence Walter Carlson 1978 174 p
Avail: Univ. Microfilms Order No. 7814746

The assumption is made that for hydrogen and helium the important interaction occurs along the surface exit trajectory. A simple model of the atom-surface interaction potential for this problem was developed. The lowest six adiabatic states of a hydrogen atom in the vicinity of the surface together with the WKB states for the conduction electrons in the metal, served as a basis for the numerical solution of the time dependent Schrodinger equation in the semiclassical approximation. The behavior of a helium atom in the same environment was studied in an approximate way using hydrogenic wavefunctions. The

results show a strong dependence of calculated ratios of excited states on core velocity for hydrogen. The sensitivity of the results to variations in the work function of the metal, ion exit velocity, and several model dependent parameters is discussed.
Dissert. Abstr.

N78-33890 California Inst. of Tech., Pasadena.
MEASUREMENT OF TRANSITION PROBABILITIES FOR Mn I LINES AND THE MANGANESE SOLAR ABUNDANCE Ph.D. Thesis
Thomas Russell Greenlee 1978 176 p
Avail: Univ. Microfilms Order No. 7815211

Absolute transition probabilities were measured for 81 lines from 14 upper levels of Mn I. Upper limits of transition probabilities for another 14 lines from 7 of these levels were also measured. The method used was the measurement of relative transition probabilities of lines from each upper level and the normalization of these relative probabilities to a scale set by the measured lifetime of the upper level. The transition probabilities of four lines were used with equivalent widths and a model atmosphere to calculate a value for the solar abundance of manganese. The ratios of abundances of manganese, iron, and nickel were compared with corresponding ratios predicted by four models of nucleosynthesis. The closest agreement with the observations was obtained from models using combinations of explosive oxygen burning, explosive silicon burning and the e process with alpha-rich freezeout. Dissert. Abstr.

N78-33891 Texas Univ. at Dallas.
MULTIPHOTON ABSORPTION SPECTROSCOPY OF LITHIUM Ph.D. Thesis
Mark Edward Koch 1978 130 p
Avail: Univ. Microfilms Order No. 7815787

A spectroscopic investigation of atomic and molecular lithium was carried out in the spectral region from 7150 A to 2400 A utilizing a new detector device. This device, the heat pipe diode, employs the method of space charge ion detection in the heat pipe oven. CW and pulsed dye lasers as well as classical light sources were used. Multiphoton absorption was observed in both the atom and molecule and a hybrid resonance involving both the atom and the molecule was detected. All the known molecular transitions were observed except the A-X transition (red bands). The weakness of the signal due to this band system made possible the observation of a new multiphoton molecular band system from 6000 A to 5875 A excited by a CW dye laser; with pulsed laser irradiation, this system expanded to 6210 A to 5675 A. Dissert. Abstr.

N78-33892 Rochester Univ., N. Y.
INVESTIGATIONS OF RESONANCE FLUORESCENCE Ph.D. Thesis
Harry Jeffrey Kimble 1978 205 p
Avail: Univ. Microfilms Order No. 7815286

The interaction of a two-level atom with a resonant electromagnetic field was investigated. A theory of resonance flurorescence is developed in the Heisenberg picture and within the framework of quantum electrodynamics. The theory is generalized from the case of monochromatic excitation to include the effect of a finite bandwidth exciting field. Solutions are obtained for the time evolution of the fluorescence intensity, the spectral density of the fluorescence and the two-time intensity correlation function of the fluorescence. Special attention is paid to the role by the quantum fluctuations of the field in obtaining these solutions. The design and construction of an atomic beam apparatus, a dye laser and an optical and electronic arrangement for data collection and processing are described. The sodium atom can be successfully prepared as a two-level atom by optical pumping. The use of optical pumping to successfully prepare a sodium atom as a two-level atom is demonstrated.
Dissert. Abstr.

N78-33893 Catholic Univ. of America, Washington, D. C.
THEORETICAL STUDY OF THE DIFFERENTIAL POSITRONIUM CROSS SECTION WITH HELIUM AND ARGON TARGETS Ph.D. Thesis
Khalil Hashemi-Monavar 1978 91 p
Avail: Univ. Microfilms Order No. 78-14516

The charge exchange reactions of positrons by helium and argon are investigated. First, plane incoming and outgoing waves and then distorted waves of the McCarthy form for the incident positron were considered. The helium target were described by: (1) effective charge; (2) Hartree-Fock; and (3) Parr's correlated wave functions. For the case of an argon target, Hartree-Fock and then effective charge wave functions were utilized. In order to evaluate the wave number modification constant and the attenuation constant, on optical-model theory was studied through which polarization and absorption potentials were obtained. The sensitivity of DCS and the degree of it to the different models of the target wave functions are discussed. Through FORTRAN programs, the differential positronium cross-sections for each model at 300, 500 and 700 electron volts were computed and the angular distributions plotted. Dissert. Abstr.

N78-33894 Pittsburgh Univ., Pa.
THE IONIZATION OF URANIUM ATOMS BY ELECTRON IMPACT Ph.D. Thesis
Jeffrey Charles Halle 1978 115 p
Avail: Univ. Microfilms Order No. 7816831

The absolute total ionization cross-section was found by comparing the cross-section for ionization to the cross-section for associative ionization in the reaction U + O2 = UO2+ + e. The total cross=section for ion production has a maximum value of (7.9 + or - 1.2) x 10 to the -16 power cm squared occuring at an energy of about 50 eV. The cross-section agrees well with calculations at higher energies, but is about 33% lower than calculations for energies below 100 eV. The single ionization cross-section has a maximum of (6.58 + or - 1.7) x 10 to the -16 power cm squared at an energy of 27 ± 5 eV. The higher order ionization cross-sections have values at 500 eV that are 49%, 33% and 17% that of single ionization for n = 2, 3, 4 respectively. The value found for the true cross-section for associative ionization was (3.09 + or - 0.31) x 10 to the -17 power cm squared. Dissert. Abstr.

N78-33895 Kentucky Univ., Lexington.
TIME-RESOLVED PRODUCTION AND DETECTION OF REACTIVE ATOMS Ph.D. Thesis
Laurence William Grossman 1977 63 p
Avail: Univ. Microfilms Order No. 78-15740

A series of experiments were performed in which a population of free cesium atoms were created by photodissociation and then detected by photoionization. Two pulsed lasers in a coaxial geometry were employed. The first laser photodissociated cesium iodide molecules with a pulse of ultraviolet photons and is called the source laser. The second laser, using a technique known as resonance ionization spectroscopy, photoionized the cesium atoms within its beam and is called the detector laser. The ionization that occurred within a cylinder defined by the laser beam and the guarded ionization plate was collected and quantified for each pulse. Dissert. Abstr.

N78-33896# Cornell Univ., Ithaca, N. Y. Lab. of Plasma Studies.
PROCEEDINGS OF THE SECOND INTERNATIONAL TOPICAL CONFERENCE ON HIGH POWER ELECTRON AND ION BEAM RESEARCH AND TECHNOLOGY, VOLUME 1 Final Report
J. A. Nation and R. N. Sudan Mar. 1978 498 p refs Conf. held at Ithaca, N. Y., 3-5 Oct. 1977; sponsored in part by ERDA 2 Vol.
(AFOSR ISSA 77-0021)
(AD-A057218; AFOSR-78-1167TR-Vol-1) Avail: NTIS HC A21/MF A01 CSCL 20/8

Contents: Generation and Transport of Intense Beams; Energy Deposition in Targets; Beam Plasma Interactions; and Charged Particle Rings. GRA

N78-33897# Cornell Univ., Ithaca, N. Y. Lab. of Plasma Studies.
PROCEEDINGS OF THE SECOND INTERNATIONAL TOPICAL CONFERENCE ON HIGH POWER ELECTRON AND ION BEAM RESEARCH AND TECHNOLOGY, VOLUME 2 Final Report
J. A. Nation and R. N. Sudan Mar. 1978 420 p refs Conf. held at Ithaca, N. Y., 3-5 Oct. 1977; sponsored in part by ERDA 2 Vol.

(AFOSR ISSA 77-0021)
(AD-A057219; AFOSR-78-1168TR-Vol-2) Avail: NTIS HC A18/MF A01 CSCL 20/8

Contents: Collective Accelerators: Microwaves and Unneutralized E-Beams; Technology; and Laser Applications. GRA

N78-33898# Oak Ridge National Lab., Tenn.
OVERVIEW: HISTORY AND PERSPECTIVE OF THE SEARCH FOR SUPERHEAVY ELEMENTS
O. L. Keller, Jr. 1978 12 p refs Presented at the Symp. on Superheavy Elem., Lubbock, Tex., 9 Mar. 1978
(Contract W-7405-eng-26)
(Conf-780333-2) Avail: NTIS HC A02/MF A01

Theoretical studies have been paralleled by experimental programs concerning searches for superheavy elements. Searches using heavy ion reactions have culminated in investigations of the reaction Cm(248) + Ca(48). Spontaneous fission is most often used for the searches in nature and at accelerators because of the extreme sensitivity it allows for detection. Many kinds of samples have been counted. Some possible signs of a superheavy element were Allende meteorite. Alpha activities not corresponding to known nuclides were also reported. Although to date no superheavy elements have been discovered, the possibilities still appear strong; and the motivation generated by the search is resulting in definite advances in the techniques of theory and experiment. Perhaps the most notable of these is the development of apparatus to allow the use of synchrotron radiation to excite X-ray fluorescence for an identification. ERA

N78-33899# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
INFORMATION THEORETIC ANALYSIS OF MULTIPHOTON EXCITATION AND COLLISIONAL DEACTIVATION IN POLYATOMIC MOLECULES
C. C. Jensen, J. I. Steinfeld, and R. D. Levine (Hebrew Univ.) 1978 37 p refs Presented at 10th Quantum Electron Conf., Atlanta, May 1978
(Contract EY-76-S-02-2793; Grant AF-AFOSR-3135-77)
(COO-2793-11; Conf-780510-1) Avail: NTIS HC A03/MF A01

The procedure of maximal entropy is applied to characterize the three distributions over energy states which are of direct interest for studies of multiple photon excitation of polyatomic molecules. These distributions are the original population of the different energy states given the mean number of photons absorbed, the distribution over the final energy states after a single collision, given a well defined initial energy state and the mean energy transfer per collision, and the time evolution of the population of the different energy states due to collisional deactivation, given the mean energy transfer per collision. Good agreement with experimentally determined values of Delta epsilon, the average amount of energy removed in a collision is obtained for deactivation of sec-butyl cyclohexane, 3-hexyl, and Beta-naphthylamine by structureless collison partners such as He or Hz. ERA

N78-33900# Los Alamos Scientific Lab., N. Mex.
ELECTRON TRANSPORT CODE THEORETICAL BASIS
A. Dubi and Y. S. Harowitz Apr. 1978 10 p refs
(Contract W-7405-eng-36)
(LA-7227-MS) Avail: NTIS HC A02/MF A01

The physical and mathematical considerations involved in the treatment of the multiple collision processes are described. Traditional methods used in electron transport via Monte Carlo, are briefly examined, along with the approach to be used in the presently developed code. ERA

N78-33901# National Standard Reference Data System.
ATOMIC ENERGY LEVELS: THE RARE EARTH ELEMENTS (THE SPECTRA OF LANTHANUM, CERIUM, PRASEODYMIUM, NEODYMIUM, PROMETHIUM, SAMARIUM, EUROPIUM, GADOLINIUM, TERBIUM, DYSPROSIUM, HOLMIUM, EBRIUM, THULIUM, YTTERBIUM, AND LUTETIUM)
W. C. Martin Apr. 1978 422 p
(PB-282067/8; NSRDS-NBS-60) Copyright. Avail: NTIS HC A18/MF A01 CSCL 07D

Energy level data are given for 66 atoms and atomic ions of the 15 elements lanthanum (Z=57) through lutetium (Z=71). These data were critically compiled from published and unpublished material. Only experimentally determined energy levels are included, the energies being restricted to excitations of outer-shell electrons and to inner-shell excitations up to the soft X-ray range. The levels were taken from analyses of the spectra of atomic gases wherever possible; however, the levels for several of the triply ionized rare earths are from analyses of the spectra of the ions in crystals or solutions. GRA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N78-33902 California Univ., Berkeley.
FRAGMENTATION OF RELATIVISTIC LIGHT NUCLEI: LONGITUDINAL AND TRANSVERSE MOMENTUM DISTRIBUTIONS Ph.D. Thesis
Leonard Mahlon Anderson, Jr. 1977 139 p
Avail: Univ. Microfilms Order No. 78-12472

The production of charged nuclear fragments was measured in collisions of 0.93 GeV/c/nucleon, 1.75 GeV/c/nucleon, and 2.88 GeV/c/nucleon alpha particles on targets of carbon, copper, lead, and CH2, using a double focusing spectrometer. Single particle inclusive cross sections inserted for the production of protons, deuterons, tritons He-3 and He-4 at momenta from 0.5 to 11.5 GeV/c and angles from 0 deg to 12 deg. The relevance of the concept of limiting fragmentation to the data is discussed and possible uses of the data to study nuclear structure and particle production mechanisms are detailed. Dissert. Abstr.

N78-33903 Michigan Univ., Ann Arbor.
EFFECT OF A NONLINEAR REFRACTIVE INDEX ON FARADAY ROTATION Ph.D. Thesis
Yi Jung Yu 1978 60 p
Avail: Univ. Microfilms Order No. 78-13766

To protect a laser system from target-reflected energy, large aperture Faraday rotators were introduced into regions of high beam intensity. The linear and nonlinear Faraday effects were correlated and an empirical relationship between the two was established. Within the framework of this model it is shown that the ratio of the nonlinear paramagnetic Verdect constant to the linear paramagnetic Verdet constant is proportional to the intensity of the incident light and depends on the frequency of light, the excitation energy of the model molecule, and the temperature of the medium. This ratio is small under ordinary conditions. However, if the temperature is lowered to 1 K and an intensity of 10 to the 10th power w/cu cu is assumed for the incident light, this ratio can be of the order of, or larger, than 10/1. Dissert. Abstr.

N78-33904 Catholic Univ. of America, Washington, D. C.
ENERGY SPECTRA OF DOUBLE-SCATTERED PHOTONS Ph.D. Thesis
Frederick Lloyd Roder 1978 102 p
Avail: Univ. Microfilms Order No. 78-16893

The magnitude and energy distribution were determined of the double-scatter contribution to the total spectrum of gamma radiation scattered from a collimated source into a coplanar collimated detector. The experimental work utilized a collimated Ge(Li) detector and collimated 100 mCi Cs-137 and 10 mCi Co-60 sources; the scattering medium was commercially pure aluminum. The analytical model simulated the experimental conditions as accurately as possible and was used to compute the double-scatter contribution to the exclusion of all other orders of scatter. It was found that the principal double-scatter contribution to the energy spectrum was in the form of a well-defined peak at an energy above that of the corresponding single-scatter peak. Dissert. Abstr.

N78-33905 Wayne State Univ., Detroit, Mich.
NUCLEAR LIFETIMES IN MANGANESE-52 Ph.D. Thesis

John Philip Downing 1978 97 p
Avail: Univ. Microfilms Order No. 7816017

A 5 MeV Van de Graaff accelerator was used to measure lifetimes of excited states in Mn-52 with excitation energies below 2.5 MeV. The Doppler-shift attenuation method was used to determine the meanlives. A 45 cu cm Ge(Li) detector measured photons in coincidence with alpha particles detected near 180 deg by a 300 micron thick silicon surface barrier detector. Events were stored in sequence on magnetic tape and later read back for analysis by a PDP-8 minicomputer. A FORTRAN program was developed to extract lifetimes from the measured shifts. The cross sections for production of excited states below 3.0 MeV were measured for incident deuteron energies between 4.00 MeV and 5.25 MeV in steps of 50 KeV. Reduced transition probabilities were calculated from the meanlives. The meanlives determined are presented. Dissert. Abstr.

N78-33906 Wisconsin Univ. - Madison.
THE ELASTIC AND INELASTIC SCATTERING OF ALPHA PARTICLES BY OXYGEN-16 Ph.D. Thesis
James Harold Billen 1978 172 p
Avail. Univ. Microfilms Order No. 78-11713

Data on the elastic scattering of alphas by O-16 and on the inelastic scattering to the first five excited states of O-16 in 10 keV steps for 14.6 less than E sub alpha less than 20.4 MeV. Surface barrier detectors in a differentially pumped gas chamber measured simultaneously the differential cross section. Several computer programs were developed for online data acquistion and monitoring, and for plotting the cross sections as either angular distributions or as excitation functions. Analysis of the elastic scattering data confirmed spin-parity assignments for three levels in Ne-20 and permitted unambiguous J pion assignments for five levels. Three previously unreported Ne-20 levels at E sub x = 16.576 MeV (7) gamma sub cm.n. = 86 keV; 16.633 MeV (3-), 51 keV; and 17.204 (4+), 142 keV were also identified. Dissert. Abstr.

N78-33907# Naval Research Lab., Washington, D. C.
REPORT OF PROGRESS IN THE DEVELOPMENT OF AN ELECTRON IMPACT IONIZATION MODEL Interim Report
M. Blaha and Jack Davis Mar. 1978 28 p refs
(RR0130143)
(AD-A056363; AD-E000171; NRL-MR-3733) Avail: NTIS HC A03/MF A01 CSCL 20/8

Electron impact ionization cross sections are calculated in the distorted wave approximation. Preliminary results are given for the ground state ionization cross section for H, He(-), and Mg(-) as well as for the 2s excited level for H and are compared with the corresponding calculations using the Born approximation. In the case of H, individual and total angular momenta contributions to the partial collision strength are presented. Author (GRA)

N78-33908# Naval Research Lab., Washington, D. C.
TIME DEPENDENT ELECTRON AND ION FLOW IN PINCHED BEAM DIODES Interim Report
Roswell Lee and Shyke A. Goldstein (Science Applications, McLean, Va.) Mar. 1978 26 p refs
(DNA MIPR 78-523)
(AD-A056362; AD-E000170) Avail: NTIS HC A03/MF A01 CSCL 20/9

The time dependent impedance behavior of large-aspect-ratio, pinched-electron-beam diodes is studied using a computer simulation model. The results from a series of particle code simulations are used to construct a picture of the diode impedance as a function of voltage. This description is then used to compare calculated diode current with actual measured values, and good agreement is found. The code is also used to study dynamic pinch formation and ion current generation. A focusing model for the ions is presented. Author (GRA)

74 OPTICS

Includes light phenomena.

N78-33909 Johns Hopkins Univ., Baltimore, Md.
THE APPLICATION OF DOUBLY STOCHASTIC POISSON PROCESS ESTIMATION TECHNIQUES TO OPTICAL INTENSITY ESTIMATION FOR GAUSSIAN OPTICAL FIELDS Ph.D. Thesis
Robert Thomas Carlson 1978 149 p
Avail: Univ. Microfilms Order No. 7811766

A received optical field characterized by a Gaussian probability density and an exponential intensity autocorrelation is considered. A complex analytic signal formalism for the optical field is employed in a two dimensional state variable description for a Markov diffusion process. The optical intensity is then given by the squared modulus of the complex analytic signal. This description is consistent with the first and second order statistics of Gaussian thermal light. The posterior probability density for the optical field, conditioned on the observed photocounting record, is found to be fundamentally not computable. However, using recently developed estimation techniques for doubly stochastic Poisson processes, a differential equation for the time evolution of an approximate, nonlinear MMSE estimate of the received light intensity is found. The evolution of this intensity estimate is numerically implemented on a computer, and the performance of the estimator is experimentally determined. Dissert. Abstr.

N78-33910 Washington Univ., Seattle.
ON LINEAR OPERATIONS REALIZABLE IN COHERENT OPTICAL PROCESSOR Ph.D. Thesis
Robert Edward Francois, Jr. 1978 222 p
Avail: Univ. Microfilms Order No. 7814431

The potential of coherent optical processors for performing linear integral transform type operations is considered. It is shown that realizable operations must have transform kernels that can be constructed by a specific and well-defined algorithm. The simplest example of such kernels is the Fourier transform kernel, and the next kernel level is the correlation and convolution type kernel. The next two members of this kernel hierarchy are discussed in detail, and the general kernel generating algorithm is examined. Some appropriate practical considerations are discussed, and elementary applications of these concepts are presented. Dissert. Abstr.

N78-33911 Carnegie-Mellon Univ., Pittsburgh, Pa.
PERFORMANCE, EVALUATION, AND SPECIFICATION FOR COHERENT OPTICAL PROCESSORS Ph.D. Thesis
Thanh Ky Luu 1978 201 p
Avail: Univ. Microfilms Order No. 7814385

Criteria for the lenses in optical Fourier transform and correlator systems are addressed. The need for spatial point-by-point optical path difference lens data as a function of spatial frequency and aperture is shown and a method to obtain such data is demonstrated. Such data are also shown to be vital in the analysis of optical correlators since the normal space invariance assumption used to describe such systems is found to be inaccurate when quantitative performance is desired. The correlation plane data parameters considered are peak intensity and signal-to-noise ratio. The Fourier plane performance parameters used are: spatial frequency linearity, Fourier coefficient amplitude, mainlobe width, sidelobe level, null depth and scatter level. In all cases, both theoretical formulations and experimental confirmations are included. Dissert. Abstr.

N78-33912 Case Western Reserve Univ., Cleveland, Ohio.
OPTICAL GAIN IN OPTICALLY PUMPED METHANOL AND ITS APPLICATION TO A FIR PREAMPLIFIER Ph.D. Thesis
Francis Lawrence Merat 1978 203 p
Avail: Univ. Microfilms Order No. 7816475

The optical gain of the 118.8 micron FIR laser line pumped by the P(36) 9.695 micron carbon-dioxide laser line was studied for potential application as an optical preamplifier for FIR detectors. A rate equation model was developed which incorporates gross vibrational and rotational relaxation processes to predict FIR laser output power as a function of IR pump power, laser pressure and laser frequency. The laser lineshape as a function of the laser pressure was curve fitted to the rate equation model to yield the saturation and excitation parameters as functions of pressure. The laser lineshape was shown to be essentially

Lorentzian for pressures greater than 400 milliTorr. A transversely pumped optical preamplifier was constructed that provided optical gains up to 5 in a single pass 57.5 cm long device at 118 microns. Dissert. Abstr.

N78-33913* National Aeronautics and Space Administration. Pasadena Office, Calif.

PLURAL OUTPUT OPTIMETRIC SAMPLE CELL AND ANALYSIS SYSTEM Patent

Floyd C. Haley, inventor (to NASA) (JPL) Issued 6 Apr. 1971 8 p Filed 28 Mar. 1968 Sponsored by NASA

(NASA-Case-NPO-10233-1; US-Patent-3,573,470; US-Patent-Appl-SN-716885; US-Patent-Class-250-218; US-Patent-Class-250-227; US-Patent-Class-250-239; US-Patent-Class-356-208) Avail: NTIS Avail: US Patent Office CSCL 20F

An apparatus suitable for receiving a sample for optimetric analysis includes a sample cell comprising an opaque hollow tube. Several apertures are defined in the wall of the tubing and a lens barrel which extends beyond to opposite surfaces of the wall is supported within at least one of the apertures. A housing is provided with one channel for receiving the sample cell and a series of channels extending from the exterior housing to the sample cell apertures. A filter element is housed in each of these latter channels. These channels slidingly receive an excitation light source for a photodetector cell to permit selective focusing. A sample cell containing at least three apertures in the walls can be mounted for rotation relative to a light source or photoconduction means for simultaneous or alternative optimetric determination of the components of a single sample. The sample cell is fabricated by supporting a lens barrel within the aperture. A molten portion of glass is deposited in the lens barrel and cooled while in a horizontal position to form a lens having an acceptable angle.

Official Gazette of the U.S. Patent Office

N78-33914*# Southern Univ., Baton Rouge, La. Dept. of Mechanical Engineering.

DETERMINATION OF PARTICLE SIZE USING MEASUREMENT OF SCATTER Final Report

Robert Lloyd Scott, Jr. Oct. 1978 16 p refs

(Grant NsG-8056)

(NASA-CR-157741) Avail: NTIS HC A02/MF A01 CSCL 20F

A literature search was conducted to determine the state of the art particle size measurement by the light scatter technique. This technique may involve diffraction pattern analysis, location of minima and maxima in angular dependence of scattered light, magnitude of intensity verses angle, forward lobe scattered intensity ratio using two small angles, forward scatter in a small cone, and total scatter. Some of the more modern recordings and detection systems are video, holographic, and systems using optical processing. Author

N78-33915*# National Aeronautics and Space Administration, Washington, D. C.

OPTICAL MEASUREMENT METHODS IN THERMOGASDYNAMICS

K. Stursberg, K. Erhardt, W. Krahr, and M. Becker Oct. 1978 62 p refs Transl. into ENGLISH of "Optische Messmethoden in der Thermogasdynamik", Rept. Paper-77-051 DGLR, Berlin, 1977 52 p Original language document was announced as A78-24440 Transl. by Sci. Transl. Serv., Santa Barbara, Calif.

(Contract NASw-3198)

(NASA-TM-75333; Paper-77-051) Avail: NTIS HC A04/MF A01 CSCL 20F

A review is presented of a number of optical methods of flow measurements. Consideration is given to such spectroscopic methods as emission and absorption techniques, electron beam-stimulated fluorescence, and light scattering - Rayleigh, Raman and Mie - methods. The following visualization methods are also discussed: shadow photography, schlieren photography, interferometry, holographic interferometry, laser anemometry, particle holography, and electron-excitation imaging. A large bibliography is presented and the work is copiously illustrated with figures and photographs. Author

N78-33916# RCA Labs., Princeton, N. J.

CHARGE-COUPLED SCANNED IR IMAGING SENSORS Final Technical Report, 29 Jun. 1973 - 15 Feb. 1977

Elliott S. Kohn, Walter F. Kosonocky, and Frank V. Shallcross Griffiss AFB, N. Y. RADC Sep. 1977 87 p refs

(Contract F19628-73-C-0282; ARPA Order 2444; AF Proj. 2444)

(AD-A057115; PRRL-77-CR-24; RADC-TR-77-308) Avail: NTIS HC A05/MF A01 CSCL 17/5

This program was directed at fabricating infrared focal planes consisting of Schottky-barrier detectors multiplexed by charge-coupled shift registers, and demonstrating their imaging capability against 300K background radiation. Three devices were designed and fabricated: a 64 bit, three-phase line-array with transfer gaps, a 62 bit line array, and a 25x50 area array, the latter two with four-phase, sealed-channel, overlapping-gate, double-polysilicon structure. The detectors were palladium silicide and platinum silicide on p-silicon. Fabrication involved only standard silicon-processing operations. Excellent agreement has been obtained between calculated infrared performance and experimental data. Detector uniformity better than 1%, already achieved with palladium silicide, is adequate for staring-mode thermal imagers. These sensors make possible imagers with thermal resolution on the order of tenths of a degree C, and production costs less than present scanned systems. Author (GRA)

N78-33917# Texas A&M Univ., College Station. Dept. of Physics.

FURTHER STUDIES OF SUNLIGHT GLITTER ON A WIND-RUFFLED SEA

John A. Guinn, Jr., Gilbert N. Plass, and George W. Kattawar 18 Jun. 1978 40 p refs

(Contract N00014-75-C-0537)

(AD-A056850; TR-12) Avail: NTIS HC A03/MF A01 CSCL 03/1

Time-average intensities are computed for the glitter pattern of sunlight on a wind-ruffled sea. In the present work the azimuthally asymmetric form of the wave-slope distribution measured by Cox and Munk is used, so that the glitter pattern depends on the wind direction as well as magnitude. Results are calculated for both a clean ocean surface and one covered with an oil film. The glitter pattern is quiet different with the oil film due to the quieting action of the oil on the waves, the greater reflectivity of the surface when oil is on the surface, and the larger values of polarization for the reflected light at most typical angles in the glitter pattern. These effects are illustrated and discussed as possible methods for the detection of oil slicks. The glitter pattern observed at satellite altitudes is also calculated. Author (GRA)

N78-33918# National Technical Information Service, Springfield, Va.

FIBER OPTICS, VOLUME 2. CITATIONS FROM THE NTIS DATA BASE Progress Report, Jun. 1975 - Jul. 1977

Mona F. Smith Jul. 1978 269 p

(NTIS/PS-78/0713/4) Avail: NTIS HC $28.00/MF $28.00 CSCL 20F

This updated bibliography contains 263 abstracts. The citations cover Federally-funded research on theory, fabrication, properties, and testing of fiber optical materials. In addition, studies on fiber optical cables, connectors, waveguides, couplers, and other fiber optical system components are presented. The uses of fiber optics in data transmission systems, optical communications, signal processing, display systems, integrated optical circuits, measuring instruments, detectors, avionics, fire control systems, recording systems, and underwater communications are included. GRA

N78-33919# National Technical Information Service, Springfield, Va.

FIBER OPTICS, VOLUME 3. CITATIONS FROM THE NTIS DATA BASE Progress Report, Jul. 1977 - Jun. 1978

Mona F. Smith Jul. 1978 109 p Supersedes NTIS/PS-77/0581; NTIS/PS-76/0490; NTIS/PS-75/420; COM-74-10869 (NTIS/PS-78/0714/2; NTIS/PS-77/0581; NTIS/PS-76/0490; NTIS/PS-75/420; COM-74-10869) Avail: NTIS HC $28.00/MF $28.00 CSCL 20F

This updated bibliography contains 103 abstracts. Federally-

funded research is cited on design, theory, fabrication, performance, and testing of fiber optical materials, components, and systems. Research on cables, transmission lines, waveguides, couplers, connectors, and lasers is covered. Fiber optics application in optical communications, data transmission systems, signal processing, display systems, integrated optical circuits, measuring instruments, detectors, avionics, fire control systems, recording systems, and underwater communications are included. Symposia are also cited. GRA

N78-33920# National Technical Information Service, Springfield, Va.
FIBER OPTICS, VOLUME 2. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, Jan. 1976 - Jul. 1977
Mona F. Smith Jul. 1978 300 p
(NTIS/PS-78/0715/9) Avail: NTIS HC $28.00/MF $28.00 CSCL 20F

This updated bibliography contains 293 abstracts. Reports of worldwide research on fiber optic materials, their fabrication, processing, properties, and performance are cited. Studies on fiber optical waveguides, laser sources, couplers, connectors, cables, and materials are covered. The use of fiber optics in data transmission systems, display systems, detectors, measuring instruments, integrated optical circuits, biomedical instrumentation, signal processing, and optical communication are also included. GRA

N78-33921# National Technical Information Service, Springfield, Va.
FIBER OPTICS, VOLUME 3. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, Aug. 1977 - Jun. 1978
Mona F. Smith Jul. 1978 332 p Supersedes NTIS/PS-77/0582; NTIS/PS-76/0492
(NTIS/PS-78/0716/7; NTIS/PS-77/0582; NTIS/PS-76/0492) Avail: NTIS HC $28.00/MF $28.00 CSCL 20F

This updated bibliography contains 325 abstracts all of which are new entries to the previous edition. Citations of worldwide journal articles on optical fibers, their fabrication, manufacture, processing, properties, and testing are presented. Components such as waveguides, connectors, cables, cladding, lasers, couplers, and filters are considered. Studies on light scattering, transmission, refractivity, pulses, and waveforms are included. Applications of fiber optics in optical communications, radar, instrumentation for process control, and secure links are described. GRA

N78-33922# National Technical Information Service, Springfield, Va.
INFRARED UPCONVERSION. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jul. 1978
Mona F. Smith Jul. 1978 111 p Supersedes NTIS/PS-77/0626; NTIS/PS-76/0539; NTIS/PS-75/075
(NTIS/PS-78/0670/6; NTIS/PS-77/0626; NTIS/PS-76/0539; NTIS/PS-75/075) Avail: NTIS HC $28.00/MF $28.00 CSCL 20F

Studies on device performance, materials, theory, and applications are cited. Tunable lasers, infrared detection, crystal modulators, and frequency converters are included. GRA

N78-34030# Joint Publications Research Service, Arlington, Va.
TWO-CHANNEL HIGH-SPEED DRIVE FOR AN OPTICAL SIGHTING DEVICE, OPERATING UNDER CONDITIONS OF A RANDOM MOMENT OF LOAD ON THE OUTPUT SHAFT
I. T. Tarasova, V. A. Kudryavtsev, and M. A. Pakkanen *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 16-21 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Priborostr. (Leningrad), v. 21, no. 6, 1978 p 101-105 (For primary document see N78-34028 24-99)
Avail: NTIS HC A04/MF A01

N78-34031# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL RELATIONSHIP OF ANGULAR ABERRATIONS FOR SYSTEMS WITH INHOMOGENEOUS MEDIA
Yu. F. Yurchenko *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 22-25 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb Zaved., Priborostr. (Leningrad), v. 21, no. 6, 1978 p 105-108 (For primary document see N78-34028 24-99)
Copyright. Avail: NTIS HC A12/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N78-33923 Maryland Univ., College Park.
EQUILIBRIUM AND NONLOCAL STABILITY PROPERTIES OF BOUNDED RELATIVISTIC ELECTRON BEAM-PLASMA SYSTEMS Ph.D. Thesis
Paul Francis Ottinger 1977 214 p
Avail: Univ. Microfilms Order No. 7812888

An equilibrium model is considered that describes a partially current-neutralized relativistic electron beam passing through a charge neutralizing plasma background. Because the net current is nonzero, there is a magnetic self-field which is predominantly azimuthal, and which is assumed to be small in magnitude compared with the applied axial magnetic field. Because of the magnetic self field, the beam rotates in the slow mode as it streams along the slightly helical field lines. Axial paramagnetic effects due to the beam rotation are investigated as well as beam diamagnetism when the beam is allowed to have a small thermal spread. The dispersion equations are derived from both a cold fluid treatment and a Vlasov treatment and are agreement when the cold fluid limit of the Vlasov results is taken. The dispersion equations are fully electromagnetic so that they properly describe the beam-plasma interaction of high phase velocity waves which occur when the beam is relativistic. Dissert. Abstr.

N78-33924 California Univ., Berkeley.
MODULATED ELECTRON BEAM HEATING OF A CONTACT IONIZED LITHIUM PLASMA IN A MIRROR MACHINE Ph.D. Thesis
Thomas Alan Shepp 1977 293 p
Avail: Univ. Microfilms Order No. 7812772

An experiment is reported in which a modulated (D.C. to 50 MHz) electron beam (5 kV, 300 mA) pulse of up to 100 microns duration is used to heat a lithium plasma to temperatures up to 90 eV. Ion temperatures of up to 400 eV are achieved by subsequent magnetic mirror compression (20 kG peak) of the beam heated ions. Lithium plasma (1.0 x 10 to the minus 9th power to 5.0 x 10 to the minus 9th power/cu cm) is generated in a single-ended Q-machine geometry, coaxial with a magnetic mirror coil. A theoretical analysis is presented for the flow of the contact ionized lithium plasma along the spatially and temporally varying magnetic mirror field, and a comparison is made with experimental results. It is demonstrated that the decay in density as seen on a microwave cavity perturbation density measurement is characteristic of the cutoff of plasma from the source due to the rising mirror field and that, due to unstable radial loss, no particles are trapped by the mirror. Dissert. Abstr.

N78-33925 California Univ., Berkeley.
LASER INDUCED FLUORESCENCE IN TITANIUM OXIDE: LIFETIMES, COLLISIONS, AND INTERCOMBINATIONS Ph.D. Thesis
Jack Feinberg 1977 176 p
Avail: Univ. Microfilms Order No. 7812558

The radiative lifetimes of excited electronic states of TiO were measured using laser induced fluorescence in a 2000 C furnace. Individual states were excited using a cavity dumped argon ion laser and tunable dye laser. Fluorescence from individual levels was resolved, and decay curves were stored with a digital, delayed coincidence, sampling system. TiO-argon inelastic collision cross sections were measured for individual rotational states, and are found to vary by 30 percent between J = 17 and J = 87.

Possible velocity selective excitation effects are discussed.
Dissert. Abstr.

N78-33926 Iowa State Univ. of Science and Technology, Ames.
A TOROIDAL FUSION REACTOR DESIGN BASED ON THE REVERSED-FIELD PINCH Ph.D. Thesis
Randy Lee Hagenson 1978 103 p
Avail: Univ. Microfilms Order No. 7813228

A reactor-like plasma model was developed in order to quantify and to assess the general features of a power system based upon RFP confinement. An operating point was generated on the basis of this plasma model and a relatively detailed engineering energy balance. These results are used to generate a conceptual engineering model of the reversed-field pinch reactor (RFPR) which includes a general description of a 750 MWe power plant and the preliminary consideration of vacuum/fueling, first wall, blanket, magnet coils, iron core, and the energy storage-transfer system. Dissert. Abstr.

N78-33927 Missouri Univ. - Columbia.
AN INVESTIGATION INTO THE ENERGY EXCHANGE PROCESSES WITHIN A NONEQUILIBRIUM 4 MHz RF HELIUM PLASMA Ph.D. Thesis
Edward John March 1977 323 p
Avail: Univ. Microfilms Order No. 7814130

Energy exchange processes within a 4 MHz helium plasma were determined using a specially constructed RF discharge facility. The effect of discharge pressure and input power on excited helium N3D state population densities were determined with this facility. Microscopic plasma processes are determined from the results of a collisional-radiative nonequilibrium model. This theoretical scheme which accounts for electron-atom, atom-atom energy exchange encounters allows identification of important energy exchange processes from atomic transition rates calculated with analytically predicted N3D state population densities. The results from the collisional-radiative model are used to explain trends observed in the experimental population density measurements. Dissert. Abstr.

N78-33928 Rochester Univ., N. Y.
SPATIALLY, AND TEMPORALLY RESOLVED HARMONIC EMISSION STUDIES OF LASER PRODUCED PLASMAS Ph.D. Thesis
Steven Michael Jackel 1977 222 p
Avail: Univ. Microfilms Order No. 7815282

Harmonic light emission from laser produced plasmas at the second and three-halves harmonics of the incident laser light frequency were spatially and temporally resolved to directly provide critical and quarter-critical electron density trajectories. The harmonic emissions were viewed from a direction perpendicular to the irradiation plane of a four beam neodymium:glass laser. Experimental data were applied to the study of laser light absorption and plasma energy transport. A simple image technique was devised to significantly enhance the accuracy of edge location measurements. Application of the image analysis technique required the determination of the optical system spatial resolution. The st eak camera spatial resolution was studied and its point spread response was measured as a function of input intensity.
Dissert. Abstr.

N78-33929 Rice Univ., Houston, Tex.
TWO PROBLEMS INVOLVING IMPERFECT CONDUCTIVITY IN A COLLISIONLESS PLASMA Ph.D. Thesis
Horace Glover Mitchell, Jr. 1978 65 p
Avail: Univ. Microfilms Order No. 7814782

The first problem deals with magnetic merging, the process by which magnetic field lines in a plasma change their topology. The Sonnerup merging model, in which merging takes place in the boundary between two regions of oppositely directed magnetic field, is extended to allow plasma flow parallel to the boundary. Solutions in the extended model are found to exist as long as the change in the quantity across the boundary does not exceed a critical magnitude dependent on the field strengths and plasma densities. The second problem concerns current interruption in a collisionless plasma, the process by which currents in a plasma above a critical magnetide are spontaneously reduced by a mechanism of anomalous resistivity. A new mechanism is proposed in which a growing electrostatic wave traps current-carrying particles within the potential of the wave, thus reducing the current. Dissert. Abstr.

N78-33930# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ANOMALOUS TRANSPORT COEFFICIENTS DUE TO THE ION-ION TWO-STREAM PLASMA MICROINSTABILITY Ph.D. Thesis
Robert C. Backstrom 25 May 1978 187 p refs
(AD-A056542; AFIT/DS/PH/78-1) Avail: NTIS HC A09/MF A01 CSCL 20/9

Improved calculations of the anomalous transport coefficients due to the ion-ion two-stream plasma instability are presented. The coefficients describe the transfer of momentum and energy between the ion species by the electric fields generated by unstable waves. The calculations use electrostatic quasilinear theory in two dimensions to trace the time evolutions of the two ion species. The evolutions are continued until the transport coefficients reach their maximum values. The evolutions are done for homogeneous plasmas with warm ion beams and a single hot electron background distribution. The electrons may or may not be magnetized by a uniform magnetic field perpendicular to the ion streaming motion. The results of the evolutions indicate that a fair amount of momentum transfer from the debris to the air occurs when the relative velocity between them is less than the characteristic wave phase velocity of the plasma, the ion acoustic speed or the Alfven speed (respectively for unmagnetized or magnetized electrons). On the other hand, little transfer occurs when the relative velocity is higher than the characteristic speed. Author (GRA)

N78-33931# Innsbruck Univ. (Austria). Inst. for Theoretical Physics.
MONOTONE STEADY-STATE POTENTIAL DISTRIBUTIONS IN THE STANDARD COLLISIONLESS PLANE DIODE MODEL OF THE SINGLE-ENDED Q-MACHINE
S. Kuhn, G. Auer, and E. Mravlag Jul. 1978 55 p refs
(UNICP-FSP-78/1) Avail: NTIS HC A04/MF A01

Nine types of monotone potential distributions are distinguished and the corresponding parameter domains given. A symmetry transformation is introduced by means of which the properties of monotone increasing distributions are easily deduced from those found for monotone decreasing ones. Several sets of parameter curves of practical importance are discussed, among them the curves of constant plasma density, of constant plasma potential, of constant neutral flux towards the hot plate, and of zero net current. Examples of application are given which demonstrate that the steady-state conditions are extremely sensitive to the ionic and hot-plate properties. Possibilities of determining experimental potential distributions are discussed.
A.R.H.

N78-33932# Indiana Univ. at Bloomington. Dept. of Chemistry.
DEVELOPMENT AND CHARACTERIZATION OF MINIATURE INDUCTIVELY COUPLED PLASMA SOURCE FOR ATOMIC EMISSION SPECTROMETRY Interim Technical Report
R. N. Savage and G. M. Hieftje 3 Jul. 1978 36 p refs
(Contract N00014-76-C-0838)
(AD-A056139; ITR-13) Avail: NTIS HC A03/MF A01 CSCL 20/9

A miniature inductively coupled plasma source for atomic emission spectrometry is described and a preliminary evaluation of its analytical capabilities is presented. The mini-ICP is very economical to sustain and works well with less than 1 kW of RF power and 8L/min of argon coolant gas. In addition, the new source possesses some unique operating characteristics which simplify sample introduction. In this paper, detection limits, multi-element capabilities, and other analytical features of the mini-ICP are compared with those demonstrated by a conventional ICP source and shown to be comparable. In addition, the two plasmas are shown to exhibit similar excitation temperatures in the respective analyte observation regions (i.e., plasma tail flames). These results suggest that the mini-ICP possesses the same desirable atomization and excitation characteristics as conventional ICP sources. Author (GRA)

N78-33933# Air Force Geophysics Lab., Hanscom AFB, Mass.
THE BEHAVIOR OF GRIDDED SPHERICAL AND PLANAR ELECTRON PROBES IN A NON-MAXWELLIAN PLASMA **Environmental Research Papers**
William J. Burke and Michael Smiddy 16 Mar. 1978 18 p refs
(AD-A056961; AFGL-TR-78-0064; AFGL-ERP-628) Avail: NTIS HC A02/MF A01 CSCL 22/2

The responses of gridded spherical and planar electrostatic probes to plasmas with kappa type distribution functions are analyzed along lines developed by Mott-Smith and Langmuir. Specifically, consider a case that could be encountered when a satellite is in the outer reaches of the plasma-sphere. Practical rules are developed for calculating the plasma's spectral index (K), its mean thermal energy, and density. It is shown that treating the plasma as though it were Maxwellian, can lead to serious overestimates of the mean thermal energy but less serious overestimates of the electron density. GRA

N78-33934# California Univ., Los Angeles. Plasma Physics Group.
EXCITATION OF LARGE AMPLITUDE PLASMA WAVES BY RUNAWAY ELECTRONS
J. N. Leboeuf, T. Tajima, and G. J. Morales Apr. 1978 23 p refs
(Contract N00014-75-C-0476)
(AD-A056788; PPG-349) Avail: NTIS HC A02/MF A01 CSCL 20/9

A relativistic computer simulation demonstrates that the application of a dc electric field enhances the excitation of plasma waves through runaway electrons. The presence of an elongated tail in the distribution function gives rise to acoustic-type modes which interact strongly with the runaway population. The waves produce a strong drag which reduces the runaway momentum increase from 2/3 to 1/2 of the free fall value. A threshold dc electric field is found above which there is no collective slowdown. Author (GRA)

N78-33935# California Univ., Los Angeles. School of Engineering and Applied Science.
MULTIPLE STAGE OPTIMAL CONTROL PROBLEMS WITH APPLICATIONS TO PLASMA HEATING BY NEUTRAL INJECTION **Interim Report**
Ken Tomiyama Dec. 1977 134 p refs
(Grant AF-AFOSR-2662-74; AF Proj. 2301)
(AD-A056856; UCLA-ENG-7780; AFOSR-78-1191TR) Avail: NTIS HC A07/MF A01 CSCL 20/9

Three classes of multiple stage optimal control problems are studied. The derived results are applied to the problem of toroidal plasma heating by means of neutral injection. First a two-stage optimal control problem having an integral cost functional, whose integrand changes its form at an unspecified switching time, is considered. An existence theorem and two sets of necessary conditions for an optimal control and switching time are derived for a general two-stage problem. The optimal heating problem is reformulated as a multi-stage optimal control problem using a single-temperature model of the plasma. The optimal heating program is shown to assume one of three possible on-off forms, depending on the heating time duration. Finally, the stability of two classes of ion temperature feedback control systems is discussed. The results suggest the possibility of regulation of the ion temperature using feedback-controlled neutral injection. GRA

N78-33936# California Univ., Los Angeles. School of Engineering and Applied Science.
STIMULATED RAMAN SCATTERING INVOLVING TWO PLASMA WAVES **Interim Report**
L. C. Himmell Oct. 1977 38 p refs
(Grant AF-AFOSR-2662-74)
(AD-A056855; UCLA-ENG-7769; AFOSR-78-1189TR) Avail: NTIS HC A03/MF A01 CSCL 20/9

The parametric decay of an intense, coherent electromagnetic wave into a plasma wave and scattered electromagnetic waves in a homogeneous plasma (stimulated Raman scattering) is generalized to include coupling of secondary waves in the plasma. The secondary waves consist of a plasma wave harmonic and its associated mixed electromagnetic-electrostatic sidebands. Explicit results are obtained for wave amplitudes and nonlinear growth rates when gamma t = or is greater than 1, where gamma is the linear growth rate of the fundamental. It is shown that, in this regime, the nonlinear growth rate gamma sub NL is 2 gamma/3. Author (GRA)

N78-33937# California Univ., Los Angeles. School of Engineering and Applied Sciences.
MULTIDIMENSIONAL NONLINEAR LANGMUIR WAVES **Interim Report**
P. K. C. Wang Oct. 1977 34 p refs
(Grant AF-AFOSR-2662-74)
(AD-A056851; UCLA-ENG-7766; AFOSR-78-1192TR) Avail: NTIS HC A03/MF A01 CSCL 20/9

The formation, interaction and collapse of nonlinear Langmuir waves in plasmas have been studied extensively in recent years. In most of the existing works, attention is focused primarily on the formation and interaction of solitary waves. Exact expressions for these solitary waves for various regimes have been obtained only for the one-dimensional case. Recently, the possibility of existence of solitary Langmuir waves for higher dimensions was discussed. This study obtains conditions for the existence or nonexistence of multidimensional, nonlinear Langmuir travelling waves, including the periodic and the usual solitary waves. GRA

N78-33938# Oak Ridge National Lab., Tenn. Fusion Energy Div.
FINITE BETA TOROIDAL PLASMAS
Glenn Bateman, D. B. Nelson, D. J. Sigmar, and N. A. Uckan May 1978 52 p refs
(Contract W-7405-eng-26)
(ORNL/TM-6273) Avail: NTIS HC A04/MF A01

These four papers on high beta Tokamak instabilities, fundamental time scales for flux conserving Tokamak heating, intense Tokamak heating in the adiabatic approximation, and the Elmo bumpy torus were presented. ERA

N78-33939# Oak Ridge National Lab., Tenn.
REVIEW OF INSTABILITY THEORY FOR HIGH PRESSURE TOKAMAK PLASMA
A. B. Mikhailovskii and I. B. Kurchatov Apr. 1978 48 p refs Transl. into ENGLISH from Russian report
(Contract W-7405-eng-26)
(ORNL/TR-4610) Avail: NTIS HC A03/MF A01

The review consists of the following sections: (1) introduction and history (2) role of the nonhydromagnetic part of the perturbed pressure in nonpotential (electromagnetic) instabilities, (3) the shear effect on nonpotential instabilities, (4) nonpotential trapped particle modes, (5) the role of magnetic confinement of resonant particles in nonpotential instabilities, (6) quasi-odd Alfven modes, (7) short wavelength nonpotential instabilities, (8) nonpotential instabilities of a streaming plasma of high pressure with inhomogeneous velocity profile, (9) drift effects in the MHD mode theory for a Tokamak, (10) several problems of the theory of flute instability and the resistive g mode, (11) conclusion. ERA

N78-33940# Mound Lab., Miamisburg, Ohio.
TRITIUM SYSTEMS TEST FACILITY
F. A. Catasso, V. A. Maroni, W. H. Smith, W. R. Wilkes, and L. J. Wittenberg 22 Feb. 1978 105 p
(Contract EY-76-C-04-0053)
(MLM-2500) Avail: NTIS HC A06/MF A01

This TSTF proposal has two principal objectives. The first objective is to provide by mid-FY 1981 a demonstration of the fuel cycle and tritium containment systems which could be used in a Tokamak Experimental Power Reactor for operation in the mid-1980's. The second objective is to provide a capability for further optimization of tritium fuel cycle and environmental control systems beyond that which is required for the EPR. The scale and flow rates in TSTF are close to those which were projected for a prototype experimental power reactor (PEPR/ITR) and will permit reliable extrapolation to the conditions found in an EPR. The fuel concentrations will be the same as in an EPR. Demonstrations of individual components of the deuterium-tritium fuel cycle and of monitoring, accountability and containment systems and of a maintenance methodology will be achieved at various times in the FY 1979-80 time span. ERA

N78-33941# Science Applications, Inc., Boulder, Colo. Advanced Energy Systems Div.
NONLINEAR LANDAU DAMPING IN MIRROR PLASMAS
D. R. Nicholson (Colorado Univ., Boulder), R. E. Aamodt, and C. S. Liu (Maryland Univ., College Park) Feb. 1978 27 p refs
(Contract EY-76-C-03-1018)
(SAI-78-529-LJ; LAPS-11B) Avail: NTIS HC A03/MF A01

The well known drift cyclotron loss cone (DCLC) mode is shown to couple nonlinearity to a low frequency stable Rayleigh-Taylor mode through the process of nonlinear Landau damping. When the DCLC mode is linearly marginally stable, this coupling leads to an explosive instability, the time scale for which is in some agreement with the experimentally observed time between individual spikes of ion cyclotron radiation. ERA

N78-33942# National Oceanic and Atmospheric Administration, Boulder, Colo. Fusion Energy Div.
KINETIC TRANSPORT PROPERTIES OF A BUMPY TORUS WITH FINITE RADIAL AMBIPOLAR FIELD
D. A. Spong, E. G. Harris, and C. L. Hedrick Apr. 1978 101 p refs
(Contract W-7405-eng-26)
(ORNL/TM-6215) Avail: NTIS HC A06/MF A01

Bumpy torus neoclassical transport coefficients were calculted, including finite values of the radial ambipolar field. Particle and energy fluxes along with the associated transport coefficients are then calculated by taking appropriate moments of the distribution function. Particle orbits are treated by breaking them up into a vertical drift component (due to toroidicity) and a theta precessional drift (as a result of Vector E x Vector B and drifts due to the bumpy toroidal field). The kinetic equation was solved using both a functional expansion method and finite difference techniques (alternation-direction-implicit). The resulting transport coefficients exhibit a strong dependence on the ambipolar electric field and plasma collisionality. In the large electric field limit, our results are in close agreement with the earlier work of Kovrizhnykh. ERA

N78-33943# Argonne National Lab., Ill.
LOCAL MEASUREMENTS IN TWO-PHASE LIQUID-METAL MHD
G. Fabris, P. F. Dunn, and E. S. Pierson 1978 9 p refs Presented at 2d Seminar on MHD Flows and Turbulence, Beer-Sheva, Israel, 28 Mar. 1978
(Contract W-31-109-eng-38)
(CONF-780336-2) Avail: NTIS HC A02/MF A01

Since the inception of the development of a two-phase liquid-metal magnetohydrodynamic (LMMHD) power generation system at Argonne National Laboratory, increasing emphasis is placed on the relation between the characteristics of local two-phase flow structure and LMMHD generator efficiency. A local-measurements program was undertaken to characterize the local flow structure occurring inside two-phase LMMHD mixers and generators. Continuing local-measurement experiments are in progress at ANL using (single and multiple resistivity probes and (single) hot-film probes to determine local void fractions, velocities and turbulence intensities. The techniques which were tested and proved successful in air-water mixtures are now being extended to NaK-nitrogen mixtures, in which some initial tests were made. ERA

N78-33944# California Univ., Livermore. Lawrence Livermore Lab.
PLASMA SURFACE INTERACTIONS IN Q-ENHANCED MIRROR SYSTEMS
R. F. Post 23 Mar. 1978 48 p refs Presented at the 3rd Conf. on Plasma Interaction in Controlled Fusion Devices, Abingdon, Oxfordshire, England, 3 Apr. 1978
(Contract W-7405-eng-48)
(UCRL-80656; Conf-780431-5) Avail: NTIS HC A03/MF A01

Two approaches to enhancement of the Q (energy gain) factor of mirror systems are under study. These include the Tandem Mirror and the Field Reversed Mirror. In both approaches field lines exit from the ends of the system and impinge on walls located at a distance from the confinement chamber. It is possible to predict some aspects of the plasma/surface interactions of TM and FRM systems from experience obtained. Studies presently underway directed toward still further enhancing the decoupling of the plasma from the effects of plasma surface interactions at the walls are discussed, with particular reference to the problem of minimizing the effects of refluxing secondary electrons produced by plasma impact on the end walls. ERA

N78-33945# Princeton Univ., N. J. Plasma Physics Lab.
TOKAMAK CONFINEMENT
C. C. Daughney May 1978 34 p refs
(Contract EY-76-C-02-3073)
(PPPL-1442) Avail: NTIS HC A03/MF A01

Empirical electron thermal conductivity and neoclassical ion thermal conductivity are used in a simple, zero dimensional analysis of the power balance in several Tokamak experiments. The model gives reasonable understanding in all cases and emphasizes the effects of ion loss and radiation loss. The temperature dependence of the anomalous electron loss is evaluated. ERA

N78-33946# United Technologies Research Center, East Hartford, Conn.
HIGH BETA CAPTURE AND MIRROR CONFINEMENT OF LASER PRODUCED PLASMAS Semiannual Report, 1 Apr. - 30 Sep. 1977
Alan F. Haught, R. G. Tomlinson, and W. B. Ard Sep. 1977 129 p refs
(Contract EY-76-C-02-2277)
(COO-2277-10; UTRC/R77-953500-27) Avail: NTIS HC A07/MF A01

Progress is reported in the use of electron cyclotron resonance heating (ECRH) of a confined plasma as a means for producing a local electrostatic well to trap cold ions within the plasma and for providing DCLC stabilization without the energy drain effects obtained with a cold stabilizing stream. Topics discussed include: hot iron building with a laser-produced and a washer gun target; modeling ECRH stabilization; and the development of a heavy ion beam probe diagnostic to measure the space potential within a mirror plasma. Thomson scattering measurements were used to calibrate the complex response of an electron cyclotron resonance microwave radiometer. The time history of the electron temperature for the decaying mirror confined laser plasma target was measured with and without streaming plasma stabilization. ERA

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N78-33947 Connecticut Univ., Storrs.
THE HYDROTHERMAL SYNTHESIS AND CRYSTAL GROWTH OF HYDROXYPHOSPHATES Ph.D. Thesis
Ferdinand Andrew Ruszala 1978 127 p
Avail: Univ. Microfilms Order No. 7813861

Synthetic and crystal growth techniques were developed for the following materials: Ca10(PO4)6(OH)2, hydroxyapatite: Ca10(PO4)6(OH,Cl)2, chlorhydroxyapatite; Ca9HM2+(PO4)7, M = Mn, Co, Ni, Cu, whitlockite; Cu3(CO3)2(OH)2, azurite; Cu2(CO3)(OH)2, malachite; M2(PO4)(OH), M = Fe, Mn, Co, triploidite; M5(PO4)2(OH)4, M = Mn, Co; Co3(PO4)2.H2O. Experiments were conducted in sealed goal capsules at hydrostatic pressures of 40-60 kpsi and temperatures of 300-600 C. In addition, attempts to grow crystals of Y2O3 and ZrO2 under hydrothermal conditions are described. The crystal structures of Co5(PO4)2(OH)4 and Mn5(PO4)2(OH)4 were determined and refined by full-matrix least-squares procedures using automatic diffractometer data to an isotropic residual R = 0.059 (R sub w = 0.0/6) for Co5(PO4)2(OH)4 and an anisotropic residual R = 0.033 (R sub W = 0.043) for Mn5(PO4)2(OH)4.
Dissert. Abstr.

N78-33948 California Univ., Berkeley.
WAVELENGTH MODULATION SPECTROSCOPY OF SEMICONDUCTORS Ph.D. Thesis
Stanley Erwin Kohn 1977 121 p
Avail: Univ. Microfilms Order No. 7812638

The use of modulation spectroscopy to study the electronic properties of solids was very productive. The construction of a wide range wavelength modulation spectrometer to study the optical properties of solids is described in detail. Extensions of the working range of the spectrometer into the vacuum ultraviolet are discussed. Measurements of the reflectivity and derivative reflectivity spectra of the lead chalcogenides, the chalcopyrite ZnGeP2, the layer compounds GaSe and GaS and their alloys, the ferroelectric SbSI, layer compounds SuS2 and SnSe2, and HfS2 were made. The results of these measurements are presented along with their interpretation in terms of band structure calculations. Dissert. Abstr.

N78-33949 Connecticut Univ., Storrs.
PHONON SCATTERING BY DISLOCATIONS Ph.D. Thesis
Francis Louis Madarasz, III 1977 132 p
Avail: Univ. Microfilms Order No. 7813856

The theory of scattering of phonons by dislocations is discussed and applied to the problem of how the lattice thermal conductivity is reduced by dislocations in metallic alloys. In addition, the effects of dislocation vibrations are included. Two restoring potentials are considered explicitly: the Peieris potential, and the effective binding of the dislocation in an alloy by Cottrell atmospheres which tend to form around stationary dislocations. The consequences of this theory are evaluated numerically for copper-based alloys, and compared with measurements of the lattice thermal conductivity of deformed and annealed Cu-AL alloys. The theory predicts a maximum in the scattering cross-section as a function of frequency which can be related to a kink in the lattice thermal conductivity in the temperature interval of 2-3 K. Dissert. Abstr.

N78-33950 Maryland Univ., College Park.
FAR INFRARED CYCLOTRON RESONANCE IN SEMICONDUCTING LEAD TELLURIDE Ph.D. Thesis
Stephen Walter Mcknight 1977 236 p
Avail: Univ. Microfilms Order No. 7813870

Far infrared cyclotron resonance studies have been carried out on PbTe with the 118 microns and 337 microns lines from the H2O and HCN gas lasers. Samples of both n- and p-type PbTe were observed in fields up to 100 kG. Modulation techniques resulted in high resolution reflection spectra in which cyclotron resonances, magneto-plasma resonances and dielectric anomalies were identified by comparison with line shapes predicted from classical magneto-plasma theory in the local limit. Deviation of the line shapes from the classical theory were interpreted in terms of quantum effects. Data at 118 microns were interpreted as resulting from three separate Landau level transitions which give rise to resonances at different magnetic fields because of the nonparabolicity of the bands. The transition energies were fit to a 6-band k.p model and a set of band parameters was deduced which gave a consistent interpretation of all of the data at 118 microns. Dissert. Abstr.

N78-33951 Iowa State Univ. of Science and Technology, Ames.
PRECIPITATION KINETICS OF A CONTINUOUS PRECIPITATOR, WITH APPLICATION TO THE PRECIPITATION OF AMMONIUM POLYURANATE Ph.D. Thesis
Richard Conrad Hoyt 1978 153 p
Avail: Univ. Microfilms Order No. 78-13232

A mathematical model describing the kinetics of continuous precipitation was developed. This model accounts for crystal nucleation, crystal growth, primary coagulation, and secondary coagulation, with the coagulation processes being represented with average nucleation rates and effective growth rates. The kinetic model includes empirical relationships for the nucleation rates such that the population density distributions, average particle sizes, dominant particle sizes, and suspension density fractions of the crystallites, primary agglomerates, and secondary agglomerates leaving the continuous precipitator can be determined. This kinetic model has been successfully applied to the continuous precipitation of ammonium polyuranate. Dissert. Abstr.

N78-33952 Syracuse Univ., N. Y.
THE GROWTH AND CRYSTALLOGRAPHIC CHARACTERISTICS OF SULFIDE FILMS ON (111) COPPER INVESTIGATED BY RHEED Ph.D. Thesis
Orison James Cain 1977 119 p
Avail: Univ. Microfilms Order No. 7813298

Thin layers of Cu2S were grown on single crystal (111) films of copper by exposing them to sulfur vapors or to a liquid solution of sulfur in methanol. The depositions were carried out in an UHV deposition system. The sulfide films were investigated by RHEED to determine their structural characteristics. The vapor grown sulfide layers were found to be epitaxial when grown in the temperature range of 25 C to 300 C. They were grown at only about 10A - 100A/hour and varied from thin flat smooth overgrowths to rough islands. The sulfide layers grown from the liquid solution at 25 C were similar to those that were vapor grown but were found only in the hexagonal and orthorhombic form. Diffraction patterns indicated a poorer crystal quality for the rapidly grown liquid solution overgrowths. Dissert. Abstr.

N78-33953 California Univ., Berkeley.
THIN-FILM METAL-OXIDE-METAL JUNCTION DEVICES Ph.D. Thesis
Shih-Yuan Wang 1977 118 p
Avail: Univ. Microfilms Order No. 7812815

An ultra broad band nonlinear solid state device that can be integrated into integrated optical circuits was developed. The device has junction areas of 10 to the -8 power cm squared and 10 to the -10 power cm squared and with rectification capabilities that extend from D.C. to optical frequencies. The invariance of the current-voltage characteristic at high frequencies of the device was checked by scanning the I-V characteristic with a small amplitude modulated carrier and detecting the signal at the modulating frequency for various carrier frequencies. Close agreement is found between the two extremes of the EM spectrum suggesting that indeed the I-V is invariant up to the optical frequencies. Dissert. Abstr.

N78-33954 Rensselaer Polytechnic Inst., Troy, N. Y.
GROWTH AND CHARACTERIZATION OF SEMI-INSULATING GaN THIN FILMS Ph.D. Thesis
David S. Yaney 1978 121 p
Avail: Univ. Microfilms Order No. 7811540

Polycrystalline films of GaN were grown by the direct reaction of evaporated Ga with active nitrogen produced in a high power induction discharge. Growth rates of 10 micrometers were achieved on basal sapphire. The films were studied by conventional transport, optical absorption and photoelectronic techniques as a function of growth temperature. It was determined that the material is highly defected and closely compensated. All films were n-type; transport is dominated by ionized impurity scattering. Wide distributions of trapping states in the forbidden gap of unknown origin were observed. Dissert. Abstr.

N78-33955 Rochester Univ., N. Y.
BRILLOUIN SCATTERING FROM TUNGSTEN BRONZE MATERIALS Ph.D. Thesis
Robert Evan Benner 1977 162 p
Avail: Univ. Microfilms Order No. 7815263

Elastic moduli values were determined in the metallic tungsten bronze system using the technique of Brillouin light scattering. Elastic constant values for four pseudocubic sodium tungsten bronzes NaxWO3, and for a related material ReO3 were determined. Brillouin scattering was found to be a satisfactory method for determining bronze elasticity if local, laser heating of the scattering volume was taken into account. The results were related to strong, covalent B-O bonds in the AxBO3 structures, and demonstrate the feasibility of conducting a comprehensive study of bronze elasticity using the Brillouin approach. Dissert. Abstr.

N78-33956 Rochester Univ., N. Y.
IMPRESSION CREEP OF LiF AND Cu-Ni SINGLE CRYSTALS Ph.D. Thesis
Edward Chien-Chin Yu 1977 195 p
Avail: Univ. Microfilms Order No. 7815312

Modified indentation creep tests in which the indenter is a cylindrical rod with a flat end were performed on single crystals of LIF and of Cu-Ni alloys of different compositions. LIF was used to determine the dominating mechanism in impression creep, to examine the microstructures developed and to establish a general relationship with conventional creep. Based on the stress,

temperature and punch size dependences of impressing velocity and direct calculation by the finite element method, the dominating mechanism under the test conditions is attributed to dislocation motion. High temperature impression creep of Cu-Ni alloy single crystals showed two processes operating simultaneously in parallel. The high stress process follows a power creep law; the low stress process is Harper-Dorn creep. The activation enthalpy has the same value for both processes; it varies with composition similar to that for self-diffusion. Dissert. Abstr.

N78-33957 Pennsylvania Univ., Philadelphia.
MAGNETIC PROPERTIES OF TWO DILUTE SPIN SYSTEMS Ph.D. Thesis
John Thomas Prater 1978 152 p
Avail: Univ. Microfilms Order No. 7816345

The effect of varying the concentration of magnetic species on the magnetic properties of crystalline RbMn (sub I-x Mg (sub x) Cel 13 and of Ni (sub 80 -x) Fe (sub x) P14 B6 was investigated. In the chloride, two thirds of the manganese atoms interact strongly with other manganese ions to form an antiferromagnetically coupled pair. The remainder provide for a weak interaction between neighboring spin pairs. When magnesium is used to replace the manganese, the magnetic properties show a concentration dependence similar to that found in a simple antiferromagnet. A nonlinear concentration dependence was discovered in the low dilution limit, (x is less than .15). The amorphous alloys show a complicated spin-glass behavior. As the iron concentration is increased, the magnetic character of the alloy shifts from one where only long range interactions are present to one in which the nearest neighbor interactions begin to dominate. Only short range relaxation processes are active in nickel-based amorphous metals at temperatures below 300 C. Dissert. Abstr.

N78-33958 Tennessee Univ., Knoxville.
AN INVESTIGATION OF RADIATIVE LIFETIMES AND OSCILLATOR STRENGTHS FOR ALLOWED INTRA L-SHELL TRANSITIONS IN MULTIPLY-CHARGED CHLORINE IONS Ph.D. Thesis
Johnny Page Forester 1978 147 p
Avail: Univ. Microfilms Order No. 7815013

The beam-foil time-of-flight method was used to investigate radiative lifetimes and transition rates involving delta n = 0 electric-dipole transitions within the L-shell of multiply charged chlorine ions. The foil-excited EUV beam radiation was dispersed and detected with a 2.2 m grazing incidence spectrometer. Lifetimes were converted to oscillator strengths for transitions for which there exists only one channel of deexcitation. F-values and lifetimes were compared with recent theoretical predictions in tables and by making f versus Z/1 plots for individual transitions. Spectral scans were made with ion beam energies of 38 and 18 MeV. Three previously unreported lines falling at 215.2 A, and 331.9 A appear to be associated with transitions in Cl-10 and Cl-12. Dissert. Abstr.

N78-33959 Rochester Univ., N. Y.
A MODEL DIELECTRIC FUNCTION FOR SILICON Ph.D. Thesis
John Thomas Foley 1977 183 p
Avail: Univ. Microfilms Order No. 78-15275

The model was developed in three stages. First the two-band, tight-binding methods of Chadi and White were used to calculate the dielectric function which describes the response of the electrons in the highest two valence and lowest two conduction bands. The imaginary part of the dielectric function was taken to be equal to the function for low frequencies and an appropriate form of the random-phase-approximation dielectric function for higher frequencies was developed. After the latter function was derived and a systematic way of determining the relevant parameters is presented, it is shown that the composite dielectric function agrees well with the experimental results for all frequencies. Dissert. Abstr.

N78-33960 Rice Univ., Houston, Tex.
ELECTRON-SPIN POLARIZATION IN LOW ENERGY ELECTRON DIFFRACTION FROM TUNGSTEN (001) Ph.D. Thesis
Maarten Kalisvaart 1978 161 p
Avail: Univ. Microfilms Order No. 7814769

A tungsten crystal (001) and low energy electron diffraction optics were mounted on separate rotary drives which permit any one of several LEED beams to be directed through a narrow slit cut in a phosphor screen and into the fixed entrance aperture of a Mott analysis system to measure electron spin polarization. The beam intensities were measured with a spot photometer. Polarization and intensity were determined in the energy range 20-150 eV for both the 01 and 11 beams at normal incidence and for the 00 beams at angles of incidence from 10 deg through 1 deg steps. Large electron-spin polarization features are noted with polarization values dependent on both the energy and the angle of incidence of the primary electron beam. Polarizations in the range + 60 percent to - 80 percent are observed. Results show that the largest polarization features occur at energies where intensity is small. Dissert. Abstr.

N78-33961 California Inst. of Tech., Pasadena.
COMPARATIVE STUDIES OF THE STEADY STATE AND RF PROPERTIES OF PROXIMITY EFFECT BRIDGES Ph.D. Thesis
Robert Patrick McNamara 1978 209 p
Avail: Univ. Microfilms Order No. 7815980

Measurements of bridge film material properties (resistivity, coherence length, penetration depth) and geometry (length, width) were correlated to bridge steady state properties. The steady state properties examined included the current distribution of a thin film/proximity effect bridge, the magnetic field modulation of the critical current as a function of film geometry, and the critical current density of a proximity effect bridge. A model which correlates the bridge/film material and geometric properties was developed to calculate the bridge critical current density for the bridge transition temperature. Dissert. Abstr.

N78-33962 Louisiana State Univ. and A&M Coll., Baton Rouge.
RADIO FREQUENCY SIZE EFFECT MEASUREMENTS ON THE FERMI SURFACE OF RHENIUM Ph.D. Thesis
Terrence L. Ruthruff 1978 92 p
Avail: Univ. Microfilms Order No. 78-15638

Radio frequency size effect measurements were made to determine the dimensions of and the nature of electronic interactions on the Fermi surface of rhenium. The dimensional calipers were obtained from two thin single crystal samples with surface normals parallel to the (0001) and (1120) crystallographic axes. Through comparison with the relativistic augmented plane wave (with spin orbit coupling) band calculation of Mattheiss and de Haas-van Alphen and geometric resonance measurements, these calipers were assigned to five different segments of the Fermi surface. A very detailed model of the sixth band hole surface was constructed from the calipers assigned to this piece. It was found that the electron-electron interaction dominates the temperature dependence of the electron scattering frequency at temperatures below 5 K. Dissert. Abstr.

N78-33963 Rice Univ., Houston, Tex.
AB INITIO LCAO/MO CLUSTER-TYPE CALCULATION OF THE SELF CONSISTENT ELECTRONIC SCREENING CHARGE DENSITY AROUND A SINGLE HYDROGEN IMPURITY IN A NICKEL CRYSTAL Ph.D. Thesis
Russell Woodward Simpson 1978 112 p
Avail: Univ. Microfilms Order No. 7814802

The electronic structure for a Ni6 cluster embedded in bulk Ni by use of a spin-averaged local-exchange self-consistent-field Ni crystal potential was calculated with an ab initio LCAO/MO variational method. A single H impurity was added at the cluster center (FCC octahedral interstitial site) and the H-Ni6 electronic structure calculated iteratively until the change in charge density from the Ni6 charge density was self-consistent within a radius of 2.0 a.u. from the proton. Plots of the charge density identified bonding and non-bonding cluster orbitals. The screening charge density is isotropic out to a radius of 1.0 a.u. and strongly anisotropic farther from the proton. A modified Mulliken population analysis indicated that the Ni 4s and 4p electrons play a much larger role than the Ni 3d electrons in screening the impurity. Dissert. Abstr.

N78-33964 Pennsylvania Univ., Philadelphia.
EXPERIMENTAL AND THEORETICAL STUDY OF THE

SURFACE STATES/SURFACE RESONANCES ON THE (100) FACES OF GROUP VIB TRANSITION METALS Ph.D. Thesis
Shang-Lin Weng 1978 274 p
Avail: Univ. Microfilms Order No. 78-16370

Three surface resonances on the (100) faces of Group VIB metals (including tungsten, molybdenum and chromium) were identified from angle-resolved photoemission measurements using synchrotron radiation; angle-integrated photoemission using unpolarized resonance lamps; and the measurement of field-emission spectra using a high-resolution energy analyzer. A nonrelativistic, tightbinding, Green's function is proposed for calculating the orbital resolved surface density of states. The orbital character of the surface resonances is determined as well as the correlation between the photoexcitation of the surfaces resonances and the reflection and refraction effects of the photon field. Dissert. Abstr.

N78-33965 Wisconsin Univ. - Madison.
EXCITON DYNAMICS AND ENERGY TRANSFER IN PURE AND DOPED MANGANESE FLUORIDE Ph.D. Thesis
Barbara A. Wilson 1978 143 p
Avail: Univ. Microfilms Order No. 7811754

Nominally pure MnF2 and a range of Zn, Er, Eu and Yb doped samples are studied. Various nonequivalent rare earth sites are resolved, but no energy transfer between these sites is observed. At low temperatures, the exciton decay is nonexponential, independent of the particular traps present, and strongly dependent on pump intensity. Two exciton creation by the absorption of a single u.v. photon was observed in this system, and an equivalent pair decay model describes the observed qualitative behavior and fits the decay data over three orders of magnitude. Above 4K the exciton decay becomes exponential, and the intrinsic fluorescence weaker, as the transfer to traps accelerates, and becomes the dominant mode of exciton decay. The lifetime of the decay is measured directly in the pure samples up to 10K, and is inferred from the evolution of the Er fluorescence in the Er doped samples up to 26K. The temperature dependence is shown to exhibit phonon activation behavior corresponding to an energy barrier of about 12 cm susuperscript-1. Dissert. Abstr.

N78-33966 State Univ. of New York at Buffalo.
THE SPECIFIC HEAT OF HELIUM FOUR NEAR THE SUPERFLUID TRANSITION IN A CONFINED GEOMETRY Ph.D. Thesis
Tar-Pin Chen 1978 110 p
Avail: Univ. Microfilms Order No. 7817018

The specific heat of He4 confined to films and pores in filters has a rounded finite maximum shifted to a lower temperature than the bulk transition temperature. The shift exponent (lambda) and the rounding exponent (theta) obtained are 1/delta = 0.562 plus or minus 0.014 and 1/theta = 0.598 plus or minus 0.008 respectively. These results disagree with scaling predictions and model calculations. In helium, the correlation length exponent is 0.671. Data were analyzed by introducing the concept of a surface specific heat, which yielded a surface specific heat exponent of 0.547 plus or minus 0.015. A critical exponent for the surface correlation length was deduced. Dissert. Abstr.

N78-33967 West Virginia Univ., Morgantown.
LATTICE DYNAMICS OF ALPHA URANIUM Ph.D. Thesis
William Peyton Crummett 1978 146 p
Avail: Univ. Microfilms Order No. 7816976

Inelastic neutron scattering measurements of the phonon dispersion curves along the three-principle high-symmetry directions were performed to investigate the lattice dynamics of alpha-U. The dispersion curves along the (Ozeta0) and (00zeta) directions are not too unusual. However, dips and depressions are observed in the (zeta00) branches similar to those observed in high-Tsubc superconductors. Standard group theoretical techniques were employed to discern the symmetry properties of the phonon branches and to block diagnolize the dynamical matrix of the various phenological models that were applied to alpha-U. A modified form of the shell model which included axially symmetric interactions to six neighbors was found to reproduce most of the dispersion curves well, including the (zeta00) branches. Dissert. Abstr.

N78-33968# Hughes Research Labs., Malibu, Calif.
ION IMPLANTATION OF WIDE BANDGAP SEMICONDUCTORS Semiannual Technical Report, 1 Oct. 1977 - 31 Mar. 1978
C. L. Anderson, H. L. Dunlap, and C. L. Ramiller May 1978 22 p refs
(Contract N00173-78-C-0070)
(AD-A056125) Avail: NTIS HC A02/MF A01 CSCL 20/12

The principle dopant studied under this contract is Si (n-type). Topics covered in this report include: (1) encapsulation technology; (2) transferability of Si implantation technology using plasma-deposition 'silicon nitride' encapsulation; and (3) problems associated with performing channeling into (110) crystal axes of a (100)-oriented GaAs wafer. Author (GRA)

N78-33969# Pennsylvania State Univ., University Park. Materials Research Lab.
PIEZO-OPTIC PROPERTIES OF LIQUIDS UNDER HIGH PRESSURE Final Report, 1 May 1975 - 31 Dec. 1977
Pichet Limsuwan and K. Vedam 15 Apr. 1978 62 p refs
(Contract N00014-75-C-0915; NR Proj. 381-018)
(AD-A055448; MRL-KV-78-1) Avail: NTIS HC A04/MF A01 CSCL 07/4

A high pressure liquid cell interferometer to measure the variation of refractive index of liquids with pressure to 14 kbars has been constructed. The amount of liquid needed is only 3 c.c. Interferometric measurements have been carried out on twelve liquids with widely varying molecular size, shape and structure. These studies show (1) first experimental proof that the Eulerian frame-indifferent analogue strain E is a more useful strain measure than the Lagrangian strain, (2) Keane's equation of state best describes each and all liquids studied, (3) change in refractive index vs. E is linear for all liquids, even though the volume strain involved is as high as 33%. This conclusion appears to be valid for all the liquids studied thus far. Author (GRA)

N78-33970# John Carroll Univ., Cleveland, Ohio. Dept. of Physics.
HEAT PULSE PROPAGATION CHARACTERISTICS IN N-TYPE InAs
B. D. Hunt, J. Trivisonno, T. T. Long, L. A. Blyth, and C. E. Walz 20 Jul. 1978 56 p refs
(Contract N00014-75-C-0247)
(AD-A057243; PH-78-1) Avail: NTIS HC A04/MF A01 CSCL 20/12

Heat-pulse measurements have been performed between 1.6 K and 4.2 K on degenerate n-type InAs single crystals of various concentrations. In this temperature range the propagation of phonons is ballistic. Constant thin films were used as heaters and measurements were made for power inputs between 0.04 watts/sq mm and 50 watts/sq mm. Superconducting granular aluminum thin films or gold seeded tin thin films were used as bolometers for detection of the heat pulses. The results are compared with the earlier results in InSb. Author (GRA)

N78-33971# Itek Corp., Lexington, Mass. Optical Systems Div.
DIELECTRIC AND OPTICAL PROPERTIES OF THIN FILMS Final Report, 15 Jul. 1977 - 14 Jul. 1978
Ralph E. Aldrich and Salvatore C. Moreno Aug. 1978 36 p refs
(Contract DAAG29-77-C-0027)
(AD-A056822; PFR-78-040; ARO-15216.1-P) Avail: NTIS HC A04/MF A01 CSCL 20/3

For several years, Itek Corporation has been developing an electro-optic imaging device, the Itek PROM (Pockels Readout Optical Modulator). The device required an insulating layer, which acts with an electro-optic photoconductor to provide a voltage division that is detectable through the Pockels effect. The original insulating layer was Parylene C, a vapor-deposited linear polymer. The purpose of this paper is to identify other insulating or blocking layers that, possess higher dielectric constants and greater breakdown fields, are more durable, and are capable of being vacuum evaporated. The materials investigated were SiO2, Al2O3, Ta2O5, ZrO2 and TiO2. GRA

N78-33972# State Univ. of New York, Stony Brook. Dept. of Materials Science.

CLEAVAGE BEHAVIOR AS A FUNCTION OF COMPOSITION FOR SINGLE CRYSTALS OF THE Mo-Nb SYSTEM Ph.D. Thesis
A. T. Pucino Jan. 1978 177 p refs
(Contract EY-76-S-02-3476)
(COO-3476-15) Avail: NTIS HC A09/MF A01

The effect of alloying on the cleavage behavior of single crystals in the molybdenum-niobium system was investigated. Crystals of (001) tensile orientation, prepared by a modified EBZR growth technique, were precracked by spark erosion in a dielectric environment of liquid nitrogen. The crystals were subsequently tested in uniaxial tension at 77 K. ERA

N78-33973# Sandia Labs., Albuquerque, N. Mex.
OPTICAL AND PHYSICAL PROPERTIES OF EVAPORATED PbS FILM
Murphy J. Landry and R. A. Langley Apr. 1978 25 p refs
(Contract EY-76-C-04-0789)
(SAND-79-0300) Avail: NTIS HC A02/MF A01

The density, void volume, thickness, reflectivity and crystal size of vacuum-vapor-deposited Pb1S/sub X/ films were determined. Volume film density, as determined from film thickness and areal film density measurements, varied from 2.96 to 3.82 g/cu cm or approximately one-half the density of bulk PbS (rho = 7.5 g/cu cm). Film void volume measured from 49 to 61 percent. Film thickness measured with the stylus and interferometer methods were inaccurate for deposited Pb1S/sub X/ film (from 80 to 1650 nm Pb1S/sub X/ film thickness) but accurate for film overlaid with approximately 100 nm of Al (from 160 to 890 nm Pb1S/sub X/film thickness). The ion backscattering method yielded accurate X values from 0.92 to 0.97 and areal density values from 0.14 to 1.68 x 10 to the 18th power Pb atoms/sq cm. However, the film thickness calculated assuming the volume film density to be that of bulk PbS were approximately a factor of two too small. Specular reflectivity at 45 deg of the film-to-glass interface of prism substrates measured at lambda = 1060 nm decreased with increasing evaporation time at a constant evaporation rate and film thickness. ERA

N78-33974# National Technical Information Service, Springfield, Va.
LIQUID CRYSTALS. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jul. 1978
Mona F. Smith Aug. 1978 296 p Supersedes NTIS/PS-77/0744; NTIS/PS-76/0681; NTIS/PS-75/591; NTIS/PS-74/116 (NTIS/PS-78/0767/0; NTIS/PS-77/0744; NTIS/PS-76/0681; NTIS/PS-75/591; NTIS/PS-74/116) Avail: NTIS HC $28.00/MF $28.00 CSCL 20F

Research studies on optical properties, phase transformations, chemical and physical properties, molecular structure, synthesis, and testing of liquid crystals are cited. This compilation includes the use of liquid crystals in display systems, fiber optics, memory devices, and test equipment. This updated bibliography contains 289 abstracts, 23 of which are new entries to the previous edition. GRA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

N78-33975# Stanford Linear Accelerator Center, Calif.
LATTICE FIELD THEORIES: NON-PERTURBATIVE METHODS OF ANALYSIS
M. Weinstein Jan. 1978 81 p refs Presented at Banff Summer Inst. of Particles and Fields, Alberta, 25 Aug. - 5 Sep. 1977
(Contract EY-76-S-03-0326)
(SLAC-Pub-2073; Conf-770889-2) Avail: NTIS HC A05/MF A01

The possible extraction of interesting physical information from quantum field theories by studying their semiclassical versions is presented. The problem of solving for the spectrum states of any given continuum quantum field theory is considered as a giant Schroedinger problem, and then some nonperturbative methods for diagonalizing the Hamiltonian of the theory are explained without recourse to semiclassical approximations. The notion of a lattice appears as an artifice to handle the problems associated with the familiar infrared and ultraviolet divergences of continuum quantum field theory and in fact for all but gauge theories. ERA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N78-33976 Pennsylvania Univ., Philadelphia.
COOPERATIVE RESEARCH AND DEVELOPMENT AND ASSOCIATED GOVERNMENT POLICY Ph.D. Thesis
Prafulla Nara Yan Joglekar 1978 297 p
Avail: Univ. Microfilms Order No. 7816379

The basic methodology of the research is to model the resource allocation behavior of a group of firms under a variety of government policies. Individual firms are assumed to be rational, self-interested, and risk averse. R&D activities under consideration are characterized by associated risk, and the existence or nonexistence of attributes such as inappropriability, nonrivalness or interdependence. Resource allocation behavior of an industry depneds not only upon the attributes of pertinent R&D activities and member firms but also upon several other system characteristics, including industry structure (i.e., the number and relative sizes of firms involved,), and interfirm cooperation. Specific circumstances are identified under which some of the popularly held views about government intervention are valid and circumstances under which they are not. Several changes in current policies are suggested. Recommendations are provided for immediate as well as long term government action in support of cooperative R&D. Dissert. Abstr.

N78-33977# Logicon, Inc., Lexington, Mass.
MANAGEMENT INFORMATION SYSTEM FOR ESD PROGRAM OFFICES Final Report, Jul. - Nov. 1977
F. Coker, L. Johnson, and D. Smith Mar. 1978 173 p
(Contract F19628-77-C-0178)
(AD-A056103; ESD-TR-78-132) Avail: NTIS HC A08/MF A01 CSCL 09/2

This report is the result of an initial study effort to identify the management information needs and to define the requirements for an integrated information system within the AF Electronic Systems Division (ESD) acquisition environment. The Management Information System (MIS) functional requirements for the ESD Program Office are defined in terms of the Computer-Aided Design and Specification Tool. The development of the computer data base and a description of the MIS structure is included in the report. This report addresses management areas such as cost/budgeting, scheduling, tracking capabilities, and ECP control. GRA

N78-33978# Michigan Univ., Ann Arbor. Inst. for Social Research.
COMPARATIVE ISSUES AND METHODS IN ORGANIZATIONAL DIAGNOSIS. REPORT 2: THE DECISION TREE APPROACH
Gloria E. Wheeler Aug. 1978 27 p
(Contract N00014-77-C-0096)

(AD-A057160) Avail: NTIS HC A03/MF A01 CSCL 05/1

This report describes the decision-tree approach to organizational diagnosis. The advantages and disadvantages of the decision approach generally, and in this study specifically, are examined. A pre-test, using a civilian sample of 174 work groups with Survey of Organizations data, was conducted to assess various decision-tree classification criteria, in terms of their similarity to the distance function used by Bowers and Hausser (1977). The results suggested the use of a large developmental sample, which should result in more distinctly defined boundary lines between classification profiles. Also, the decision matrix was preferred over the extended decision tree, since the matrix is not path-dependent, and is probably more convenient and easily used by a decision maker. Finally, it is anticipated that the classification criteria (minimum-maximum vs. standard scores) will yield different results, with the standard score approach results perhaps being more similar to those of the distance function. Author (GRA)

N78-33979# National Inst. of Mental Health, Bethesda, Md. Div. of Computer Research and Technology.

PROJECT RMAG: SYMBOLIC LOGIC RETRIEVAL SOURCE CODE

Robert A. Magnuson 19 May 1978 174 p refs

(PB-281373/1; NIH-DCRT-DMB-SSS-AN506; NIH/DF-78/003B) Avail: NTIS HC A08/MF A01 CSCL 09B

The SLR generator, reading free-form specifications of the user's file structure, creates a customized IBM 370 COBOL program which interactively retrieves selected records from the user's file. The bulk of the work done by the generated program is accomplished by means of calls to standard subroutines, including the RMAG macrogenerator, logic subroutines and arithmetic subroutine. The SLR generator produces a source COBOL program and additional features are easily added by COBOL and programmers. The source code is contained from the various SLR modules, giving the interested programmer the knowledge needed both to modify SLR and to write his own programs which interface with those standard subroutines. GRA

N78-33980# National Inst. of Mental Health, Bethesda, Md. Div. of Computer Research and Technology.

PROJECT RMAG: SYMBOLIC LOGIC RETRIEVAL USERS GUIDE

Robert A. Magnuson 19 May 1978 103 p refs

(PB-281374/9; NIH-DCRT-DMB-SSS-UG104; NIH/DF-78/003A) Avail: NTIS HC A06/MF A01 CSCL 09B

The SLR generator, reading free-form specifications of the user's file structure, creates a customized IBM 370 COBOL program which interactively retrieves selected records from the user's file. The generated SLR program permits its user to use sentential calculus schemata, existential and universal quantifiers, sophisticated arithmetic specification, the RMAG macrogenerator and external macro libraries. The reader is shown how to use and generate SLR programs. GRA

N78-33981# SDC/Integrated Services, Inc., Research Triangle Park, N. C.

NATIONAL COMPUTER CENTER PERSONNEL MANAGEMENT INFORMATION SYSTEM DESIGN REQUIREMENTS SPECIFICATION. VOLUME 1: DESIGN REQUIREMENTS AND DATA DICTIONARY

17 Mar. 1978 249 p

(Contract EPA-68-02-2832)

(PB-282589/1) Avail: NTIS HC A11/MF A01; also available in set of 3 reports HC E14, PB-282588-SET CSCL 05I

The design requirements for an EPA personnel management information system are discussed as well as an index system which would be independent of a specific computer configuration and adaptable to a data base management system. Topics cover: (1) processing requirements; (2) an inclusive set of reports to be produced by the system; and (3) definition of all the input data elements needed to produce those reports. GRA

N78-33982# SDC/Integrated Services, Inc., Research Triangle Park, N. C. NCC-Support Branch.

NATIONAL COMPUTER CENTER PERSONNEL MANAGEMENT INFORMATION SYSTEM DESIGN REQUIREMENTS SPECIFICATION. VOLUME 2: REPORT INDEX AND FORMATS

17 Mar. 1978 348 p

(Contract EPA-68-02-2832)

(PB-282590/9) Avail: NTIS HC A15/MF A01; also available in set of 3 reports HC E14, PB-282588-SET CSCL 05I

The personnel management information system appendices are structured to conform to the following basic management areas: awards; data base integrity; equal employment opportunity; employment and special programs; experience and education; executive development; job history; labor relations and grievances; management evaluation; national reports; position management and control; production reports; and training. Each appendix contains proposed report descriptions and formats considered pertinent to a particular management area. In many cases, reports were designed to provide data which is relevant to more than one management area. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N78-33983# Library of Congress, Washington, D. C. Network Development Office.

INITIAL CONSIDERATIONS FOR A NATIONWIDE DATA BASE Network Planning Paper No. 3

Edwin J. Buchinski, Henriette D. Avram, ed., and Sally H. McCallum, ed. 1978 59 p refs

(ISSN-0160-9742; LC-78-12977; ISBN-0-8444-0271-0) Avail: NTIS HC A04/MF A01

The basic requirements for the design and organization of a national library network are outlined. Areas covered include: rules and standards, bibliographic control, authority files, cataloging, network users, network data base, data resources, network access, cost analysis, and network growth. S.B.S.

N78-33984# Naval Postgraduate School, Monterey, Calif.

THE DESIGN AND IMPLEMENTATION OF INSTRUCTIONAL SOFTWARE INFORMATION SYSTEM (ISIS) M.S. Thesis

Ataman Yildirim Jun. 1978 103 p refs

(AD-A056323) Avail: NTIS HC A06/MF A01 CSCL 05/2

This thesis describes the design, implementation and user interface for an Instructional Software Information System (ISIS). The existing volume and increasing rate of growth of computer software production suggests the need for a catalogue procedure to help programmers find existing software to reduce redundant programming. The purpose of the ISIS is to provide an online software catalogue which does not require either prior instruction or familarity with keyword lexicons. Using ISIS, a user may record the characteristics of new software, and make searches for existing software by specifying its characteristics. Characteristics are specified by selection from a succession of menus. ISIS is implemented on a PDP-11 computer operating under the UNIX operating system using the INGRES data base management system. It is written in the QUEL query language embedded in the programming language C. Author (GRA)

N78-33985# Engineering Societies Commission on Energy, Inc., Washington, D. C.

ESCOE INFORMATION RETRIEVAL SYSTEM. SYSTEM DESCRIPTION AND OPERATION

W. J. Costley Apr. 1978 41 p refs

(Contract EF-77-C-01-2468)

(FE-2468-26) Avail: NTIS HC A03/MF A01

The Engineering Societies Commission Energy (ESCOE) Technical Information Retrieval System is described. The technical information needs of the ESCOE resident engineers in providing services to DOE were identified, and the information resources that best match those needs were examined. The assessment of information needs resulted in the selection of an ESCOE information base. The best mix of information sources and services was selected, and a remote terminal was acquired to access

those sources that are available as computerized data bases.
ERA

N78-33986# King Research, Inc., Rockville, Md.
SYSTEMS ANALYSIS OF SCIENTIFIC AND TECHNICAL COMMUNICATION IN THE UNITED STATES: THE ELECTRONIC ALTERNATIVE TO COMMUNICATION THROUGH PAPER-BASED JOURNALS Final Report
D. W. King May 1978 146 p refs 5 Vol.
(Contract NSF-C-DSI76-15515)
(PB-281847/4) Avail: NTIS HC A07/MF A01; also available in set of 5 reports HC E14, PB-281846-SET CSCL 05B

A systems analysis of scientific and technical communication in the United States was conducted to provide a factual and analytical framework in which to consider the electronic alternative to paper-based communication. The study included the identification of generic functions, detailed description of current journal communication practices and an Electronic Alternative, development of a cost model and scenario construction. Results indicate that many scientific and technical journal articles can economically be incorporated into a comprehensive Electronic Alternative. It is expected that most articles will be processed electronically during some part but not all of their production cycles. GRA

N78-33987# King Research, Inc., Rockville, Md.
SYSTEMS ANALYSIS OF SCIENTIFIC AND TECHNICAL COMMUNICATION IN THE UNITED STATES. ANNEX 1: COMMUNICATION FUNCTIONS IN SCIENCE AND TECHNOLOGY
D. W. King and N. K. Roderer May 1978 89 p refs 5 Vol.
(Contract NSF-C-DSI76-15515)
(PB-281848/2) Avail: NTIS HC A05/MF A01; also available in set of 5 reports HC E14, PB-281846-SET CSCL 05B

The development of a functional framework for scientific and technical journal communication is documented. Generic functions; origination, transmission, recording, preservation, and end-use, are defined. Both the current practices and the electronic alternatives are specified in terms of activities comprising these functions. The bases for the functional definitions of S and T communications are also presented. GRA

N78-33988# King Research, Inc., Rockville, Md.
SYSTEMS ANALYSIS OF SCIENTIFIC AND TECHNICAL COMMUNICATION IN THE UNITED STATES: ANNEX 2: THE CURRENT PRACTICES
D. W. King and N. K. Roderer May 1978 302 p refs 5 Vol.
(Contract NSF-C-DSI76-15515)
(PB-281849/0) Avail: NTIS HC A14/MF A01; also available in set of 5 reports HC E14, PB-281846-SET CSCL 05B

The current practices in S&T journal communication in the United States, focussing primarily on 1975 are described. Cost and volume data are presented on the activities of authors, publishers, libraries, and secondary services, and end-users. Analyses include consideration of three sizes of journals, four fields of science, three communication paths, and trends observed over time. A major focus is on the economic interactions between participants. GRA

N78-33989# King Research, Inc., Rockville, Md.
SYSTEMS ANALYSIS OF SCIENTIFIC AND TECHNICAL COMMUNICATION IN THE UNITED STATES. ANNEX 3: AN ELECTRONIC ALTERNATIVE
D. W. King and N. K. Roderer May 1978 84 p refs 5 Vol.
(Contract NSF-C-DSI76-15515)
(PB-281850/8) Avail: NTIS HC A05/MF A01; also available in set of 5 reports HC E14, PB-281846-SET CSCL 05B

A likely electronic alternative to current journal communication practice is described in terms of generic functions. The annex discusses positive and negative factors which will influence developments in this area. Author

N78-33990# King Research, Inc., Rockville, Md.
SYSTEMS ANALYSIS OF SCIENTIFIC AND TECHNICAL COMMUNICATION IN THE UNITED STATES. ANNEX 4: THE COST MODEL
D. W. King and N. K. Roderer May 1978 115 p refs 5 Vol.
(Contract NSF-C-DSI76-15515)
(PB-281851/6) Avail: NTIS HC A06/MF A01; also available in set of 5 reports HC E14, PB-281846-SET CSCL 05B

The cost model used in the systems analysis of scientific and technical journal communication is described. Any large number of model parameters reflecting volume, process and cost information, are associated with the activities performed under each function. By selecting appropriate parameters, it is possible to simulate either current practice or the electronic alternative under a wide variety of input process and output conditions. The annex includes descriptions of model components, methodologies for using the model and some specific model results. GRA

N78-33991# Little (Arthur D.), Inc., Cambridge, Mass.
PASSING THE THRESHOLD INTO THE INFORMATION AGE: PERSPECTIVE FOR FEDERAL ACTION ON INFORMATION. VOLUME 1: BASIC FINDINGS REPORT Final Report
V. Giuliano, M. Ernst, J. Dunlop, S. Crooks, and J. Becker Jan. 1978 113 p 2 Vol.
(Grant NSF DSI-76-08930-A01)
(PB-281720/3) Avail: NTIS HC A06/MF A01 CSCL 05B

Scientific and technical information transfer has had only low priority for national attention recently. Three eras of scientific information transfer are identified: a continuing traditional era that emphasizes transfer of disciplinary knowledge; a post World War II era devoted to mission-relation information; and an emerging era oriented toward socio-economic-technical systems problems. A description of the information eras and their implications; current issues and problems; the stakeholders involved and their perspectives; and possible action steps to improve the present infrastructure are provided. GRA

N78-33992# Little (Arthur D.), Inc., Cambridge, Mass.
PASSING THE THRESHOLD INTO THE INFORMATION AGE: PERSPECTIVE FOR FEDERAL ACTION ON INFORMATION. VOLUME 2: RESEARCH REPORT Final Report
V. Giuliano, M. Ernst, J. Dunlop, S. Crooks, and J. Becker Jan. 1978 96 p 2 Vol.
(Grant NSF DSI-76-08930-A01)
(PB-281721/1) Avail: NTIS HC A05/MF A01 CSCL 05B

The appendices are targeted to information professionals, peer reviewers of National Science Foundation grant study effort, and operating agency information people. Data and arguments are presented with further completeness, with more references to source data and prior work of the authors and others. References are made to the initial goals and methodology of the grant effort. Detailed discussions are offered of important specialized topics. GRA

N78-33993# State Univ. of New York at Albany. Comparative Development Studies Center.
LEGISLATURES AND INFORMATION SYSTEMS. AN OVERVIEW AND ANALYSIS OF RECENT EXPERIENCE
John A. Worthley 1977 40 p refs
(PB-282050/4) Avail: NTIS HC A03/MF A01 CSCL 05B

The use of modern technology for meeting legislative information needs and its impact on the policy making function of the legislatures as well as on their institutional development is discussed. Recent legislative information systems experience is assessed and a framework for analysis is developed. Legislative experience with modern information systems has been both cautious and consequential. Evidence to date indicates that information system development can significantly strengthen the legislature's policy making capacity and representative functions. GRA

N78-33994# State Univ. of New York at Albany. Comparative Development Studies Center.
LEGISLATURES AND INFORMATION SYSTEMS: CHALLENGES AND RESPONSES IN THE STATES
John A. Worthley 1977 31 p refs
(PB-282051/2) Avail: NTIS HC A03/MF A01 CSCL 05B

Until recently, modern technologies were seldom employed by state legislatures to harness, process, and analyze relevant and desired information. During the past eight years, however, several states have taken strides in this direction. An embryonic theoretical perspective useful to legislative innovators is presented along with an account of recent developments in legislative information systems and an analytical framework for studying

those developments and their impact on both legislature and the political system as a whole. GRA

N78-33995# Office of Telecommunications, Boulder, Colo. Inst. for Telecommunication Sciences.
RELATIONS BETWEEN BIT AND BLOCK ERROR PROBABILITIES UNDER MARKOV DEPENDENCE
Edwin L. Crow Mar. 1978 22 p refs
(PB-281545/4; OTR-78-143) Avail: NTIS HC A02/MF A01 CSCL 09D

If the the sequence of correct and incorrect bits received over a communication system is governed by a stationary two-state Markov chain, and the bits are grouped into blocks of size n, then the blocks are also governed by such a chain. The relations between the two parameters (the bit error probability and the conditional bit error probability) of the bit chain and the two corresponding parameters of the block chain are derived and evaluated. A confidence region for the latter is derived from a confidence region for the former, and thence a confidence interval for the block error probability. Approximations for the probability of m errors in a block are outlined. GRA

N78-33996# General Accounting Office, Washington, D. C. Energy and Minerals Div.
DEPARTMENT OF ENERGY'S CONSOLIDATION OF INFORMATION PROCESSING ACTIVITIES NEEDS MORE ATTENTION
3 May 1978 54 p refs
(PB-281269/1; EMD-78-60) Avail: NTIS HC A04/MF A01 CSCL 09B

The House Committee on Government Operations asked GAO to review the Department of Energy's information processing activities. The report presented several recommendations to the Secretary of Energy and to the Congress to improve management of information-related activities funded by the Department. GRA

N78-33997# General Accounting Office, Washington, D. C. Logistics and Communications Div.
AGENCIES' IMPLEMENTATION OF AND COMPLIANCE WITH THE PRIVACY ACT CAN BE IMPROVED
6 Jun. 1978 39 p
(PB-281768/2; LCD-78-115) Avail: NTIS HC A03/MF A01 CSCL 05B

Federal agencies are making a concerted effort to implement and comply with the Privacy Act. Various instances of noncompliance were identified at the locations reviewed. The noncompliance appeared to result from misinterpretation of the act or guidelines or unfamiliarity with the act. Periodic evaluations of Privacy Act compliance should be made at agency locations to determine whether additional training or other action is required. Aslo, opportunity exists for reducing paperwork and administrative workload. GRA

N78-33998# Mitre Corp., McLean, Va. METREK Div.
MACHINE-READABLE IDENTIFICATION SYSTEM FOR LIBRARY MATERIALS
C. J. Egyhazy and J. S. Lovelace Apr. 1978 98 p refs
(Grant PHS-LM-64753)
(PB-282499/3; MTR-7672; LHNCBC-78-03; NLM/LHC-CR-1801) Avail: NTIS HC A05/MF A01 CSCL 05B

The state-of-the-art in machine-readable material identification systems for library circulation and inventory control is discussed. There are three major sections of the report: bar-code and optical character recognition (OCR) technologies; a limited survey of the users of the technology and their experinces as they adopted it; and a summary of the current efforts towards the development of national standards for the library community. GRA

N78-33999# Krall Management, Inc., Radnor, Pa.
THE CONCEPTUAL FRAMEWORK FOR A COMPREHENSIVE AND CONTINUING STI RESOURCE INVENTORY Final Report
John H. Grose Apr. 1978 117 p refs Prepared in cooperation with Franklin Inst. Research Labs., Philadelphia
(Grant NSF DSI-76-05484)
(PB-282345/8) Avail: NTIS HC A06/MF A01 CSCL 05B

An assessment of the requirements of users and suppliers of these resources and the current STI enterprise capabilities was made. Various implementation considerations were compiled and synthesized, and a conceptual framwork for the continuing pursuit of an STI resource inventory was formulated. The primary function of such an STI Resource Inventory is to act as an inteface between the users and suppliers of STI in the information industry. GRA

N78-34000# National Bureau of Standards, Washington, D. C.
SCIENCE ON ITS WAY TO WORK: ACTIVITIES OF THE NATIONAL BUREAU OF STANDARDS
Michael A. Baum and Sharon A. Washburn Apr. 1978 49 p Supersedes NBS-SP-467; PB-264814
(PB-282044/7; NBS-SP-498; NBS-SP-467; PB-264814) Avail: NTIS HC A03/MF A01 CSCL 05B

The activities of the National Bureau of Standards during the fiscal year ending September 30, 1977 are described. Particular attention is paid to the impact of these programs on industry, government, and the international scene, as well as our everyday lives. Emphasis is also placed on the transfer mechanisms, how technology gets from here to there. The report includes a people section, a list of selected publications, a financial statement, staff statistics, a summary of legislation on which NBS missions are based, and a directory listing the Bureau's major programs and divisions with managers and their phone numbers. GRA

N78-34001# United Kingdom Chemical Information Services, Nottingham (England).
INFORMATION TRANSFER AND USE IN CHEMISTRY Final Report
J. F. B. Rowland Mar. 1978 40 p refs
(BLL-BLRDR-5385; ISBN-0-905984-06-4) Copyright. Avail: Issuing Activity

One of the Committee's major conclusions is that there is a need for more effective co-ordination between chemical-information research and the implementation of the results of this research into information services. A study of the flows of finance, especially public money, through the scientific-information system is advocated. A shift of research emphasis from the secondary to the primary publication system is supported, but preliminary investigation of integration between these two systems should commence. The major problem areas are seen as economic and human rather than technological, but an effective watching brief on technical innovations relevant to chemical information should nevertheless be maintained. A number of more detailed recommendations are also made. Author

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N78-34002 California Univ., Berkeley.
THE EFFECT OF DISSOLVED OXYGEN CONCENTRATION ACTIVATED SLUDGE PROCESS PERFORMANCE Ph.D. Thesis
Mesut Sezgin 1977 292 p
Avail: Univ. Microfilms Order No. 7812768

A hypothesis is advanced to explain the mechanisms of filamentous sludge bulking, a property that causes a sludge to settle and compact poorly because of excessive growth of filamentous microorganisms. The postulate addresses two variables substrate concentration and aeration basin DO concentration because, in most cases, one or both of these parameters were reported to be the cause of activated sludge bulking in the treatment of domestic waste water. The effect of mixed liquor filament level on settleability of activated sludge was studied. The effect of aeration basin DO on the performance of the activated sludge process was evaluated. Dissert. Abstr.

N78-34003 Portland State Univ., Oreg.
THE STATISTICAL MANIPULATION OF DELPHI STATEMENTS Ph.D. Thesis
Bradley William Nelson 1978 247 p
Avail: Univ. Microfilms Order No. 7813886

The Delphi technique is gaining wider and wider acceptance as a tool for forecasting technology; gathering expert opinion from a local to world wide advice community upon which government, industry, and other policy making bodies must so frequently rely; and providing judgmental input for studies (e.g., social sciences) where hard data are unavailable or too difficult to obtain. An increased danger of manipulation of a Delphi to produce the results desired by one certain individual or group of individuals is studied. The results of these studies showed a high degree of success in obtaining a desired value through the use of manipulated statistical feedback. The effects of statistical manipulation on confidence as measured by self-rating was also studied. Suggestions for extending the research in the area of manipulation of Delphi statements plus a taxonomy of the variables that comprise the problem of manipulation are discussed.
Dissert. Abstr.

N78-34004 West Virginia Univ., Morgantown.
A RECYCLED-WATER SANITARY WASTE DISPOSAL SYSTEM Ph.D. Thesis
William Joseph Shoupp 1978 125 p
Avail: Univ. Microfilms Order No. 78-17003

A closed, recycled-water sanitary waste disposal system for laboratory study was developed. The system was based on a 1,000 liter capacity, water-filled biodegradation tank. Two specific environmental variables were studied: organic loading rate of an artificial waste material based on ground dog food into the system, and aeration rates imposed on the water column. Sampling of the tank was carried out on a weekly schedule via sample withdrawal from ports penetrating the tank walls. Data were collected and analyzed for the following biological and chemical parameters: total aerobic and anaerobic standard plate counts, ATP content, total carbon, inorganic carbon, organic carbon, pH, and dissolved oxygen. In addition, the predominant bacterial genera present during the stationary stages of the experimental runs were isolated and identified. Dissert. Abstr.

N78-34005 Polytechnic Inst. of New York.
MULTI-OBJECTIVE ANALYSIS APPLIED TO AREAWIDE WASTEWATER MANAGEMENT Ph.D. Thesis
Kevin John Phillips 1978 182 p
Avail: Univ. Microfilms Order No. 7816638

The study indicated that optimization techniques can be utilized not as the final answer but as an effective screening tool to enable more objectives to be considered in more detail in subsequent analysis. It was also shown that quantitatively integrating citizen preferences (objective weights) into decisions is possible and that it can be accomplished by a relatively simple questionnaire that utilizes both a pairwise comparison of objectives as well as an objective ranking technique. Finally, it was pointed out that because the objectives are all competing relative to each other, the final outcome was not as easy a decision as it might have been had only one objective been considered.
Dissert. Abstr.

N78-34006*# Southeastern Oklahoma State Univ., Durant. Technology Use Studies Center.
TECHNOLOGY UTILIZATION IN A NON-URBAN REGION: FURTHER IMPACT AND TECHNIQUE OF THE TECHNOLOGY USE CENTER Final Report
C. Henry Gold, A. M. Moore, Bill Dodd, Ron Marshall, and Susan G. West Jun. 1978 162 p
(Contract NASw-3007)
(NASA-CR-157743) Avail: NTIS HC A08/MF A01 CSCL 05A

Performance information for the center is reported. The search production during the reporting period exceeds the production record of the center during any period in its 14 year history. A performance average of 30 searches per month, which represents an increase of 45%, is reported. Numerical listings of the searches processed are given. A section of transfer and impact report is included. S.B.S.

N78-34007*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EVALUATION OF FIDC SYSTEM Final Report
Robert A. Hall, Mack W. Dowdy, and Theodore W. Price 15 Oct. 1978 132 p Prepared for DOE
(Contract NAS7-100)
(NASA-CR-157763; JPL-Pub-78-93) Avail: NTIS HC A07/MF A01 CSCL 21A

A fuel vapor injector/igniter system was evaluated for its effect on automobile engine performance, fuel economy, and exhaust emissions. Improved fuel economy and emissions, found during the single cylinder tests were not realized with a multicylinder engine. Multicylinder engine tests were conducted to compare the system with both a stock and modified stock configuration. A comparison of cylinder-to-cylinder equivalence ratio distribution was also obtained from the multicylinder engine tests. The multicylinder engine was installed in a vehicle was tested on a chassis dynamometer to compare the system with stock and modified stock configurations. The fuel vapor injector/igniter system (FIDC) configuration demonstrated approximately five percent improved fuel economy over the stock configuration, but the modified stock configuration demonstrated approximately twelve percent improved fuel economy. The hydrocarbon emissions were approximately two-hundred-thirty percent higher with the FIDC system than with the stock configuration. Both the FIDC system and the modified stock configuration adversely affected driveability. The FIDC system demonstrated a modest fuel savings, but with the penalty of increased emissions, and loss of driveability. A.R.H.

N78-34008# Burns and McDonnell, Kansas City, Mo.
ASSESSMENT OF THE ROLE OF ADVANCED TECHNOLOGIES IN SMALL UTILITIES Final Report
P. Steitz and G. Mayo May 1978 173 p Sponsored by the Electric Power Research Inst.
(EPRI-EM-696-Vol-2) Avail: NTIS HC A08/MF A01

The potential role of six advanced technologies in small municipal and rural electric utility systems was assessed by comparing the economics of utilizing these advanced technologies with the economics of conventional generation types. The technologies examined included: a 5-MW coal-fired diesel engine; a 5-MW coal-fired closed cycle combustion turbine; a 2-MW coal-fired Stirling engine; a 2-MW oil-fired Stirling engine; a 1-MW organic Rankine cycle bottoming on a 5-MW diesel and a 1-MW two-phase engine bottoming on a 5-MW diesel engine. If the heat rates projected are achieved, significant market penetration could be realized at capital costs of $250 to $300 per kilowatt in 1975 dollars. The coal-fired diesel has the lowest break-even capital cost and, even allowing for the uncertainties of operation and maintenance, costs would be only marginally

attractive at a cost above $500/kW. The coal-fired combustion turbine and the coal-fired Stirling engine could be attractive at costs below $450/kW and $650/kW respectively. ERA

N78-34009# Federal Highway Administration, Washington, D.C. Program Management Div.
NATIONAL HIGHWAY INVENTORY AND PERFORMANCE SUMMARY-FROM THE 1976 NATIONAL HIGHWAY INVENTORY AND PERFORMANCE STUDY Final Report
Clifford M. Comeau Dec. 1977 588 p
(PB-281101/6; FHWA/PL-78/006) Avail: NTIS HC A25/MF A01 CSCL 13B

To make available significant national and State inventory and performance data which isn't published elsewhere in this level of detail are documented 1975 data on the physical aspects of the highway plant and its operating and performance characteristics is reported. It includes data for rural and urban arterial and collector systems. The tables or figures are included on type of facility and functional class; volume/capacity ratio; peak hour operating speed and vehicle miles of travel; average overall travel speed and vehicle hours of travel; K, D, and truck factors; pavement type and condition; right-of-way width and land area; and rural horizontal and vertical alignment. S.E.S.

N78-34010# Transportation Systems Center, Cambridge, Mass.
SAN DIEGO WHEELCHAIR ACCESSIBLE BUS STUDY Interim Report, Feb. - Apr. 1977
Robert F. Casey Sep. 1977 50 p
(PB-281087/7; DOT-TSC-UMTA-77-41; UNTA-MA-06-0049-77-8) Avail: NTIS HC A03/MF A01 CSCL 13B

The implementation and early operation of a pilot project of fixed route, wheelchair accessible bus service on two routes of the San Diego Transit system is described. Five buses of the Transit Authority fleet were retrofitted with wheelchair lifts by the lift manufacturer. Four lift equipped buses are used in the service with one bus held as a spare. Relatively few lift problems were encountered. Ridership by wheelchair confined persons has been low and a number of possible reasons for this are enumerated. GRA

N78-34011# Mathtech, Inc., Princeton, N. J.
NETWORK AGGREGATION IN TRANSPORTATION PLANNING. VOLUME 1: SUMMARY AND SURVEY Final Report, Jul. 1976 - 1977
Donald W. Hearn Apr. 1978 100 p refs
(Contract DOT-TSC-1232)
(PB-281384/8; DOT-TSC-RSPD-78-8.1) Avail: NTIS HC A05/MF A01 CSCL 13B

Research on network aggregation in transportation models is summarized. A survey is included of network aggregation practices, definition of an extraction aggregation model, computational results on a heuristic implementation of the model, and related mathematical results. GRA

N78-34012# Mathtech, Inc., Princeton, N. J.
NETWORK AGGREGATION IN TRANSPORTATION PLANNING. VOLUME 2: A FIXED POINT METHOD FOR TREATING TRAFFIC EQUILIBRIA Final Report, Jul. 1976 - 1977
Harold W. Kuhn Apr. 1978 75 p refs
(Contract DOT-TSC-1232)
(PB-281385/5; DOT-TSC-RSPD-78-8.2) Avail: NTIS HC A04/MF A01 CSCL 13B

A new algorithm is defined for the network equilibrium model that works in the space of path flows and is based on the theory of fixed point method. The goals were broadly defined as the identification of aggregation practices and the development of a framework for studying these practices. These goals were accomplished by, (1) conducting a survey of aggregation practices, (2) formulating an aggregation model, (3) conducting a computational study, (4) deriving mathematical programming formulations aimed at making steps of the model precise, and (5) programming and testing a particular algorithm. GRA

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N78-34013*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
X RAY SPECTRA OF X PER
R. H. Becker, E. A. Boldt, S. S. Holt, S. H. Pravdo, J. Robinson-Saba, P. J. Serlemitsos, and J. H. Swank Sep. 1978 17 p refs Submitted for publication
(NASA-TM-79646) Avail: NTIS HC A02/MF A01 CSCL 03A

The cosmic X-ray spectroscopy experiment on OSO-8 observed X Per for twenty days during two observations in Feb. 1976 and Feb. 1977. The spectrum of X Per varies in phase with its 13.9 min period, hardening significantly at X-ray minimum. Unlike other X-ray binary pulsar spectra, X Per's spectra do not exhibit iron line emission or strong absorption features. The data show no evidence for a 22 hour periodicity in the X-ray intensity of X Per. These results indicate that the X-ray emission from X Per may be originating from a neutron star in a low density region far from the optically identified Be star. A.R.H.

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N78-34014*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ARE THE STRATOSPHERIC DUST PARTICLES METEOR ABLATION DEBRIS OR INTERPLANETARY DUST?
Maxwell B. Blanchard and Frank T. Kyte (San Jose State Univ., Calif.) Aug. 1978 50 p refs
(NASA-TM-78507; A-7524) Avail: NTIS HC A03/MF A01 CSCL 03B

Natural and laboratory created fusion crusts and debris from artificial meteor samples were used to develop criteria for recognizing meteor ablation debris in a collection of 5 to 50 micron particles from the stratosphere. These laboratory studies indicate that meteor ablation debris from nickel-iron meteoroids produce spherules containing taenite, wuestite, magnetite, and hematite. These same studies also indicate that ablation debris from chondritic meteoroids produce spheres and fragmentary debris. The spheres may be either silicate rich, containing zoned olivine, magnetite, and glass, or sulfide rich, containing iron oxides (e.g., magnetite, wuestite) and iron sulfides (e.g., pyrrhotite, pentlandite). The fragmentary debris may be either fine-grained aggregates of olivine, magnetite, pyroxene, and occasionally pyrrhotite (derived from the meteorite matrix) or individual olivine and pyroxene grains (derived from meteorite inclusions). A.R.H.

N78-34015*# Stanford Univ., Calif. Inst. for Plasma Research.
PARTICLE ACCELERATION IN PULSAR MAGNETOSPHERES
Kile B. Baker Oct. 1978 77 p refs
(Grant NGR-05-020-668)
(NASA-CR-157768; SUIPR-762) Avail: NTIS HC A05/MF A01 CSCL 03B

The structure of pulsar magnetospheres and the acceleration mechanism for charged particles in the magnetosphere was studied using a pulsar model which required large acceleration of the particles near the surface of the star. A theorem was

developed which showed that particle acceleration cannot be expected when the angle between the magnetic field lines and the rotation axis is constant (e.g. radial field lines). If this angle is not constant, however, acceleration must occur. The more realistic model of an axisymmetric neutron star with a strong dipole magnetic field aligned with the rotation axis was investigated. In this case, acceleration occurred at large distances from the surface of the star. The magnitude of the current can be determined using the model presented. In the case of nonaxisymmetric systems, the acceleration is expected to occur nearer to the surface of the star. A.R.H.

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N78-34016 Lehigh Univ., Bethlehem, Pa.
COOLING RATE VARIATIONS WITHIN THE GROUP IV A IRON METEORITES Ph.D. Thesis
Arthur Eugene Moren 1978 200 p
Avail: Univ. Microfilms Order No. 7815823

Cooling rates determined for twelve group IV A iron meteorites using a phase growth model based on the ternary system Fe-Ni-p. The phase growth model simulates non-isothermal diffusion controlled precipitate growth, corresponding to the growth of kamacite in a taenite matrix. Output from the simulation is used to create a family of cooling rate curves on plots of central taenite nickel vs. taenite half width for each meteorite. Measured taenite half widths and central taenite nickel values are compared to simulated results in order to uniquely define a meteorite's cooling rate (CR). The results show a variation in CR across the group IV A iron meteorites with the cooling rate inversely correlated with nickel content. The variation in cooling rates argues against a core model and favors a radial distribution of these meteorites in an asteroidal sized parent body with a radius of 100-150 km. Dissert. Abstr.

N78-34017* National Aeronautics and Space Administration, Washington, D. C.
RADIOPHYSICAL INVESTIGATIONS OF VENUS FROM SPACECRAFT
M. A. Kolosov and O. I. Yakovlev Oct. 1978 12 p refs Transl. into ENGLISH from Zemlya Vselennaya (USSR), no. 3, May - Jun. 1978 p 33-37 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75578) Copyright. Avail: NTIS HC A02/MF A01 CSCL 03B

The atmosphere and topography of Venus were studied in detail from the Venera-9 and Venera-10. Research on plasma around the Sun was also carried out. Information on pressure, temperature and gas composition of the atmosphere in five regions of the planet was obtained. The Venera-9 and Venera-10 transmitted useful information for several months, making a detailed study possible. Radio waves and fluoroscopy were used as the research methods. Author

N78-34018 Polytechnic Inst. of New York.
ESCAPE OF GASES FROM PLANETARY ATMOSPHERES Ph.D. Thesis
Gopal V. Ramanathan 1978 151 p
Avail: Univ. Microfilms Order No. 7816640

The theoretical formulation of dynamic expansion of a planetary atmosphere was developed for a spherically symmetric geometry. Numerical solutions were obtained for a one dimensional steady state radial flow, in which the conduction terms were neglected. This approximation may be valid for planetary bodies sufficiently far away from the sun to have low temperature gradients. For computations, Io was used as the sole constituent. Solutions for a molecular hydrogen atmosphere exhibited many features similar to that of the polytropic solution of Parker for the solar coronal expansion. Difficult mathematical problems arose in connection with point of singularity and the various branches of solution in the phase plane. Numerical techniques for solving these problems are described and illustrated. Also investigated was the role of molecular diffusion in possibly controlling the escape rate by processes other than dynamic outflow. Dissert. Abstr.

N78-34019*# Calspan Corp., Buffalo, N. Y.
APPLICATION OF PHOTOMETRIC ANALYSES FOR INTERPRETATION OF MARS-MARINER VI AND VII IMAGERY Final Report
Robert E. Kinzly Jul. 1977 90 p refs
(Contract NASw-2222)
(NASA-CR-157757; CALSPAN-VE-3104-M-1) Avail: NTIS HC A05/MF A01 CSCL 03B

The application of radiometric analysis in the interpretation of Mariner 6 and 7 imagery is investigated and illustrated. The following types of problems were felt could be addressed using this imagery: (1) evaluation of local reflectivity changes; (2) augmentation of geological mapping; (3) discrimination of atmospheric phenomena; and (4) investigation of polar cap structure. G.Y.

N78-34020*# Little (Arthur D.), Inc., Cambridge, Mass.
INFRARED SPECTRA OF LUNAR SOIL ANALOGS
J. R. Aronson Jul. 1977 41 p refs
(Contract NASw-2918)
(NASA-CR-157742) Avail: NTIS HC A03/MF A01 CSCL 03B

The infrared spectra of analogs of lunar soils were investigated to further the development of methodology for interpretation of remotely measured infrared spectra of the lunar surface. The optical constants of dunite, bytownite, augite, ilmenite, and a mare glass analog were obtained. The infrared emittance spectra of powdered minerals were measured and compared with spectra calculated by the reflectance theory using a catalog of optical constants. The results indicate that the predictions of the theory closely simulate the experimental measurements if the optical constants are properly derived. A.R.H.

N78-34021*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
METEOR ABLATION SPHERES FROM DEEP-SEA SEDIMENTS
M. B. Blanchard, D. E. Brownlee (California Inst. of Technology, Pasadena), T. E. Bunch, P. W. Hodge (Washington Univ., Seattle), and F. T. Kyte (San Jose State Univ., Calif.) Sep. 1978 45 p refs
(NASA-TM-78510; A-7549) Avail: NTIS HC A03/MF A01 CSCL 03B

Spheres from mid-Pacific abyssal clays (0 to 500,000 yrs old), formed from particles that completely melted and subsequently recrystallized as they separated from their meteoroid bodies, or containing relict grains of parent meteoroids that did not experience any melting were analyzed. The spheres were readily divided into three groups using their dominant mineralogy. The Fe-rich spheres were produced during ablation of Fe and metal-rich silicate meteoroids. The glassy spheres are considerably more Fe-rich than the silicate spheres. They consist of magnetite and an Fe glass which is relatively low in Si. Bulk compositions and relict grains are useful for determining the parent meteoroid types for the silicate spheres. Bulk analyses of recrystallized spheres show that nonvolatile elemental abundances are similar to chondrite abundances. Analysis of relict grains identified high temperature minerals associated with a fine-grained, low temperature, volatile-rich matrix. The obvious candidates for parent meteoroids of this type of silicate sphere is a carbonaceous chondrite. A.R.H.

N78-34022*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PRELIMINARY STUDIES OF ELECTROMAGNETIC SOUNDING OF COMETARY NUCLEI
Andrew Gabriel, Larry Warne, Steven Bednarczyk, and Charles Elachi 1 Oct. 1978 37 p refs
(Contract NAS7-100)
(NASA-CR-157764; JPL-Pub-78-44) Avail: NTIS

HC A03/MF A01 CSCL 03B

The internal structure of a comet could be determined with a spacecraft borne electromagnetic sounder. A dielectric profile of the comet could be produced in direct analogy with terrestrial glacier and ice sheet sounding experiments. This profile would allow the detection of a rocky core or ice layers if they exist, just as layers in the ice and the bedrock interface have been clearly observed through the Greenland ice sheet. It would also provide a gross estimate of the amount of dust in the icy region. Models for the response of the nucleus and cometary plasma to electromagnetic sounding are developed and used to derive experimental parameters. A point system design was completed. Preliminary engineering study results indicate that the sounder is well within the bounds of current space technology. G.G.

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N78-34023*# University of Southern Calif., Los Angeles.
PROPOSED ROCKET EXPERIMENTS TO MEASURE THE PROFILE AND INTENSITY OF THE SOLAR He1584A RESONANCE LINE Semi-Annual Status Report, 1 Jul. 1977 - 31 Dec. 1977
Darrell L. Judge 23 Feb. 1978 80 p refs
(Grant NsG-5108)
(NASA-CR-156779) Avail: NTIS HC A05/MF A01 CSCL 03B

The intensity and profile of the helium resonance line at 584 A from the entire disc of the sun was investigated using a rocket-borne helium-filled spectrometer and a curve of growth technique. The line profile was found to be accurately represented by a Gaussian profile with full width at half maximum of 122 plus or minus 10m A while the integrated intensity was measured to be (2.6 plus or minus 1.3) x 10 to the 9th power/photons sec sq cm at solar levels of F sub 10.7 = 90.8 x 10 to the minus 22th power/sq m H sub z and R sub z = 27. The measured linewidth is in good agreement with previous spectrographic measurement but the integrated intensity is larger than most previous photoelectric measurements. However, the derived line center flux of (2.0 plus or minus 1.0) x 10 to the 10th power/photons sec sq cm A is in good agreement with values inferred from airglow measurements. Author

N78-34024*# ADAPT Service Corp., Reading, Mass.
UPDATING OF ADAPT PREDICTIONS OF SUNSPOT ACTIVITY Final Report, Nov. 1977 - Jun. 1978
Herbert C. Hunter Jul. 1978 108 p refs
(Contract NAS8-32851)
(NASA-CR-150823) Avail: NTIS HC A06/MF A01 CSCL 03B

An eigenvector analysis procedure was used to analyze and develop algorithms for predicting sunspot numbers. The predictors in these algorithms consist of sunspot numbers from the preceding two solar cycles and magnetic index data from the preceding cycle. Predictions are presented for cycles 21 and 22. The sunspot activity for cycle 21 is predicted to remain below 100 until early 1980 when it will rapidly reach a peak of approximately 120. The two sigma accuracy on these estimates is approximately 20 sunspot numbers in the region of the peak and 10 sunspot numbers early and late in the cycle. Algorithms were also developed for predicting the period of future sunspot cycles using the same predictor vector. A.R.H.

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N78-34025*# California Univ., Berkeley. Space Sciences Lab.
EXPERIMENT DEFINITION AND INTEGRATION STUDY FOR THE ACCOMMODATION OF GIANT, PASSIVE DETECTOR OF EXOTIC PARTICLES IN THE COSMIC RAYS (EPIC) PAYLOAD ON SHUTTLE/SPACELAB MISSIONS Final Report, 6 Jun. 1977 - 5 Feb. 1978
P. Buford Price 1 Jun. 1978 74 p refs
(Contract NAS5-24166)
(NASA-CR-156842; SSL-Ser-19-Issue-37) Avail: NTIS HC A04/MF A01 CSCL 03B

The feasibility of the design, construction, launch and retrieval of a hinged 15 ft by 110 ft the platform containing an array of interleaved CR-39 and Lexan track-recording detectors to be placed into circular orbit by space shuttle is assessed. The total weight of the detector assembly plus supporting structure and accessories is 32,000 pounds. The modular construction permits as little as one fourth of the payload to be exposed at one time. The CR-39 detector has sensitivity adequate to detect and study cosmic rays ranging from minimum ionizing iron-group nuclei to the heaviest elements. The detectors will survive a one year exposure to trapped protons without losing their high resolution. Advantages include low cost, huge collecting power (approximately 150 sq m) as well as the high resolution previously attainable only with electronic detectors. A.R.H.

N78-34026*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBSERVABILITY OF THE NEUTRINO FLUX FROM THE INNER REGION OF THE GALACTIC DISK
R. Silberberg (NRL), M. M. Shapiro (NRL), and F. W. Stecker Oct. 1978 6 p refs Submitted for publication
(NASA-TM-79658) Avail: NTIS HC A02/MF A01 CSCL 03B

The observability of galactic neutrinos in a detector of 10 billion tons of water with an observing time of a few years is explored. Although the atmospheric flux exceeds the galactic flux considerably at energies greater than or equal to 1 TeV, the latter may still provide a marginally observable signal owing to its directionality. Galactic muon neutrinos with energy greater than or equal to 1 TeV will produce a signal approximately 2 sigma above the atmospheric background over a four year period. If electron neutrinos can also be studied with the deep underwater muon and neutrino detector, then galactic electron neutrinos above 1 TeV would give an approximate 4 to 5 sigma signal above the electron neutrino background over a four year integration time. A.R.H.

N78-34027*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE DYNAMICAL HALO AND THE VARIATION OF COSMIC-RAY PATH LENGTH WITH ENERGY
Frank C. Jones Sep. 1978 22 p refs Submitted for publication
(NASA-TM-79647) Avail: NTIS HC A02/MF A01 CSCL 03B

It is shown that the dynamical halo model offers a natural explanation for the form of the variation of the cosmic-ray path length with energy. The variation above approximately 1 GeV/nucleon can be understood as due to the variation of the diffusion coefficient, and hence the resident time, with energy. The flattening of the curve below 1 GeV/nucleon is seen to mark a transition to a convection dominated regime where coefficient is no longer the determining parameter. A fit to the observations yields a halo outflow velocity of 8 km sec/1. An attempt is made to determine the overall scale of the halo and the diffusion coefficient using recent Be-10 flux measurements but the data do not agree well enough to pin down these variables to within less than four or five orders of magnitude. Author

99 GENERAL

N78-34028# Joint Publications Research Service, Arlington, Va.
TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY:

PHYSICAL SCIENCES AND TECHNOLOGY, NO. 49
20 Sep. 1978 69 p refs Transl. into ENGLISH from various Russian journals
(JPRS-71896) Copyright. Avail: NTIS HC A04/MF A01

Information is presented on the U.S.S.R.'s research and development efforts in: (1) cybernetics, computers and automation technology; (2) engineering and equipment; (3) geophysics, astronomy and space; (4) physics; and (5) scientist and scientific organizations. For individual titles, see N78-34029 through N78-34034.

N78-34029# Joint Publications Research Service, Arlington, Va.
LASER LIGHT SOURCE ILLUMINATING DEVICE DESIGN FEATURES DISCUSSED c36
V. V. Khvalovskiy, S. N. Natarovskiy, and V. I. Nalivayko *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 8-15 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Priborostr. (Leningrad), v. 21, no. 6, 1978 p 94-101 (For primary document see N78-34028 24-99)
Copyright. Avail: NTIS HC A04/MF A01

Optical systems of illuminating devices with a laser as the light source are discussed. A technique is given for calculating the size of the area illuminated and the distribution of illuminance in the subject plane. Author

N78-34030# Joint Publications Research Service, Arlington, Va.
TWO-CHANNEL HIGH-SPEED DRIVE FOR AN OPTICAL SIGHTING DEVICE, OPERATING UNDER CONDITIONS OF A RANDOM MOMENT OF LOAD ON THE OUTPUT SHAFT c74
I. T. Tarasova, V. A. Kudryavtsev, and M. A. Pakkanen *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 16-21 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved, Priborostr. (Leningrad), v. 21, no. 6, 1978 p 101-105 (For primary document see N78-34028 24-99)
Avail: NTIS HC A04/MF A01

Discussed here is a unified follow-up system of the speed-speed type, used to control the speed of a drive for an optical sighting device. Equations are given for the rotational velocity of the drive's output shaft and a determination is made of the conditions for invariance of the speed in relation to the moment of load. An experimental investigation is made of a model of a two-channel high-speed drive (DSP) under conditions of a random static moment of load on the output shaft. Author

N78-34031# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL RELATIONSHIP OF ANGULAR ABERRATIONS FOR SYSTEMS WITH INHOMOGENEOUS MEDIA c74
Yu. F. Yurchenko *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 22-25 refs Transl. into ENGLISH from Izv. Vyssh. Ucheb Zaved., Priborostr. (Leningrad), v. 21, no. 6, 1978 p 105-108 (For primary document see N78-34028 24-99)
Copyright. Avail: NTIS HC A12/MF A01

Discussed here is the relationship between total aberration and angular aberrations occurring on the surfaces of an optical system with variable refractive indices. Author

N78-34032# Joint Publications Research Service, Arlington, Va.
BIOLOGICAL EXPERIMENTS ON BOARD SALYUT-6 c51
Aleksandr Kamin *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 26-32 Transl. into ENGLISH from Tekhnika-molodezhi (Moscow), no. 6, 1978 p 12-13 (For primary document see N78-34028 24-99)
Copyright. Avail: NTIS HC A04/MF A01

A description is given of the experiments carried out on Salyut-6 while in space. It is explained how weightlessness retards the growth of higher plants. A discussion is presented of the effects of gravity on cell division. LS

N78-34033# Joint Publications Research Service, Arlington, Va.
PULSATIONS AND EXPANSION OF THE EARTH: A POSSIBLE KEY TO AN UNDERSTANDING OF ITS TECTONIC DEVELOPMENT AND VOLCANISM IN THE PHANEROZOIC c46
Ye. Ye. Milanovskiy *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 33-52 refs Transl. into ENGLISH from Priroda (Moscow), no. 7, Jul. 1978 p 22-34 (For primary document see N78-34028 24-99)
Copyright. Avail: NTIS HC A04/MF A01

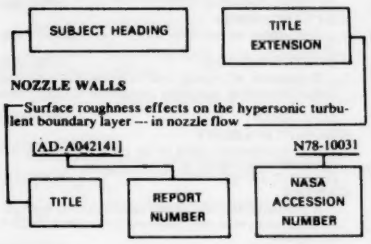
From the geological standpoint it is proposed that the idea of some general expansion of the earth in the Mesocenozoic, like the idea of periodic pulsations of the earth, is very likely. Although the scale of the expansion remains insufficiently clear. LS.

N78-34034# Joint Publications Research Service, Arlington, Va.
SOVIET LASER SPECTROSCOPY RESEARCH REVIEWED c36
V. Ketokhov *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 49 (JPRS-71896) 20 Sep. 1978 p 53-56 Transl. into ENGLISH from Izvestiya (Moscow), 19 Aug. 1978 p 3 (For primary document see N78-34028 24-99)
Avail: NTIS HC A04/MF A01

Methods utilizing the selective effect of laser radiation provide the basis for a new approach to the technology of matter. Using beams of light, it is possible to manipulate atoms and molecules of a certain kind and collect microscopic quantities of matter composed of literally a single kind of atom or molecule. The most important process in this technology is undoubtedly the derivation of particularly pure substances, alloys, and molecular compounds. Successful experiments to remove undesirable molecular impurities from a gaseous substance were conducted. LS.

SUBJECT INDEX

Typical Subject Index Listing



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7050).

A

ABLATION
Meteor ablation spheres from deep-sea sediments
[NASA-TM-78510] N78-34021
ABLATIVE NOSE CONES
Hardened reentry vehicle development program. Erosion-resistant nosetip technology
[AD-A056390] N78-33128
ABSORPTION SPECTRA
Measurement of absorption coefficients of water in the visible spectral region, phase 1 and 2
[PB-281500/9] N78-33182
Multiphoton absorption spectroscopy of lithium
N78-33891
ABSTRACTS
Closed loop control systems. Part 1: Aircraft. A bibliography with abstracts
[NTIS/PS-78/0809/0] N78-33122
ABUNDANCE
Measurement of transition probabilities for Mn I lines and the manganese solar abundance
N78-33890
AC GENERATORS
Parameter estimation for generator simulation studies
[AD-A057006] N78-33351
ACCELERATION (PHYSICS)
Development of a high acceleration gas generation system
[AD-A056751] N78-33250
ACCELEROMETERS
ATS-6 flight accelerometers --- in-flight monitoring of spacecraft dynamic response
[NASA-TM-79847] N78-33096
Development, test, and calibration of a three-axis accelerometer system
[AD-A056711] N78-33408
ACCIDENT PREVENTION
Hazardous material spills: A documentation and analysis of historical data
[PB-281090/1] N78-33631
ACETATES
Thermoplastic rubber comprising ethylene-vinyl acetate copolymer, asphalt and fluxing oil
[NASA-CASE-NPO-88351] N78-33228
ACIDS
Mass transport and acid-base generation in solution/membrane systems: Extension of Nernst-Planck treatment to electrolytic multicomponent systems
N78-33159
Effect of radiation and acids on thermal stability of ion exchange resins
[RFP-2652] N78-33238
Quantitative mapping by remote sensing of an ocean acid-waste dump
[NASA-TP-1275] N78-33617
ACOUSTIC ATTENUATION
Measurements of energy exchange between acoustic fields and non-uniform steady flow fields
N78-33249
ACOUSTIC DELAY LINES
Microwave acoustic and bulk device technique studies
[AD-A057256] N78-33348
ACOUSTIC DUCTS
Impedance measurement using a two-microphone, random-excitation method
[NASA-TM-78785] N78-33875
ACOUSTIC EMISSION
Acoustic emission testing of composite vessels under sustained loading
[NASA-TM-78981] N78-33150
ACOUSTIC IMPEDANCE
Impedance measurement using a two-microphone, random-excitation method
[NASA-TM-78785] N78-33875
ACOUSTIC MEASUREMENTS
Acoustic identification of marine sediments by stochastic methods
N78-33695
Tissue identification by ultrasound
[NASA-CR-157776] N78-33716
ACOUSTIC SOUNDING
Acoustic sounder array for application to air pollution. Volume 1: Executive summary and user guide
[PB-282064/5] N78-33670
Acoustic sounder array for application to air pollution. Volume 2: Case studies and other appendices
[PB-282065/2] N78-33671
ACOUSTIC VELOCITY
Revised simplified formulae for calculating the speed of sound in sea water
[AD-A056556] N78-33877
ACOUSTICAL HOLOGRAPHY
Acoustic holography. Citations from the NTIS data base
[NTIS/PS-78/0700/1] N78-33885
Acoustic holography. Citations from the engineering index data base
[NTIS/PS-78/0701/9] N78-33886
ACRYLIC RESINS
Streaming birefringence in extensional flow of polymer solutions
N78-33365
ACTIVATED SLUDGE
The effect of dissolved oxygen concentration activated sludge process performance
N78-34002
ACTIVATION
Methanation catalysts: Activity, adsorption and degradation studies of nickel and nickel bimetallic catalysts for methanation
N78-33161
ADAPTIVE CONTROL
A learning control system with application to flight systems
N78-33112
Closed loop control systems. Part 1: Aircraft. A bibliography with abstracts
[NTIS/PS-78/0809/0] N78-33122
Adaptive stochastic control of linear systems with random parameters
[AD-A056849] N78-33822
ADHESION
Effects of deburring contaminants on electroplating adhesion
[BDX-613-1757-REV] N78-33397
ADHESIVE BONDING
Primary Adhesively Bonded Structure Technology [PABST]. Phase 1: Detail design
[AD-A056857] N78-33095
A technique for assessing the durability of structural adhesives
[AD-A057197] N78-33235
ADHESIVES
A technique for assessing the durability of structural adhesives
[AD-A057197] N78-33235
ADSORPTION
Methanation catalysts: Activity, adsorption and degradation studies of nickel and nickel bimetallic catalysts for methanation
N78-33161
AERIAL PHOTOGRAPHY
Detection and location of reseaux using pictorial pattern recognition
N78-33502
Aerial thermography for energy conservation
[NASA-TM-78959] N78-33510
Manual for the application of NURE 1974-1977 aerial gamma-ray spectrometer data
[GJBX-13-78] N78-33519
AERODYNAMIC CHARACTERISTICS
Geometry requirements for unsteady aerodynamics in aeroelastic analysis and design
[NASA-TM-78781] N78-33046
Effects of wing leading-edge deflection on the low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration
[NASA-TM-78787] N78-33047
Aerodynamic derivatives for an oblique wing aircraft estimated from flight data by using a maximum likelihood technique
[NASA-TP-1336] N78-33054
Missile aerodynamic parameter and structure identification from flight test data
[AD-A056343] N78-33055
AERODYNAMIC DRAG
Development of base pressure similarity parameters for application to space shuttle launch vehicle power-on aerodynamic testing
[NASA-CR-150826] N78-33134
AERODYNAMIC LOADS
Aerodynamic load distributions at transonic speeds for a close-coupled wing-canard configuration: Tabulated pressure data
[NASA-TM-78780] N78-33045
Comparison of concurrent strain gage- and pressure transducer-measured flight loads on a lifting reentry vehicle and correlation with wind tunnel predictions
[NASA-TP-1331] N78-33053
An investigation of wing buffeting response at subsonic and transonic speeds: Phase 1: F-111A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152109] N78-33113
AERODYNAMIC STABILITY
Hybrid computer study of the sensitivity of aircraft dynamics to aerodynamic cross-coupling
[SAND-77-1309C] N78-33121
AERODYNAMICS
Aeronautical engineering: A continuing bibliography with indexes, supplement 100
[NASA-SP-7037[100]] N78-33035
AEROELASTICITY
Geometry requirements for unsteady aerodynamics in aeroelastic analysis and design
[NASA-TM-78781] N78-33046
AEROEMBOLISM
Hyperbaric oxygenation. A bibliography with abstracts
[NTIS/PS-78/0676/3] N78-33724
AERONAUTICAL ENGINEERING
Aeronautical engineering: A continuing bibliography with indexes, supplement 100
[NASA-SP-7037[100]] N78-33035
Description of a model for evaluating operational performance of communications system
[AD-A057199] N78-33313
AERONOMY
Theoretical and experimental studies of the atmospheric sodium layer
[NASA-CR-157770] N78-33653
AEROSPACE ENGINEERING
Canada in space
N78-33126
From space on a parachute
[NASA-TM-75577] N78-33140
Engineering in the 21st century
[NASA-TM-79010] N78-33380
CAD/CAM data management needs, requirements and options
N78-33778
AEROSPACE VEHICLES
RIM: A prototype for a relational information management system
N78-33785

AGE FACTOR
An estimation procedure for the 3-parameter Weibull distribution in modeling hypertension data
N78-33854

AGING [MATERIALS]
Surface acoustic wave stabilized oscillators: Additional aging results
[NASA-CR-156833] N78-33340

AGRICULTURE
A distribution model for the aerial application of granular agricultural particles
[NASA-CR-157745] N78-33048
Development of heavily vegetated area in Brazil
[E78-10157] N78-33507
Environmental Development Plan [EDP]: Solar agricultural and industrial process heat, 1977
[DOE/EDP-0002] N78-33568

AIR CARGO
Characteristics of future air cargo demand and impact on aircraft development: A report on the Cargo/Logistic Airlift Systems Study [CLASS] project
[NASA-TM-78774] N78-33061

AIR CONDITIONING
Development of flat-plate solar collectors for the heating and cooling of buildings: Executive summary
[NASA-CR-124804] N78-33527

AIR JETS
Axisymmetric air jet impinging on a hemispherical concave plate
N78-33039

AIR POLLUTION
The nature and formation of nitrogenous air pollutant emissions from combustion systems
N78-33611
Advances in alpha air monitoring instrumentation
[LA-UR-78-1150] N78-33623
Computer simulation of the visual effects of smoke plumes
[LA-UR-78-689] N78-33625
MAP3S: Studying the transport, transformation, and fate of atmospheric energy-related pollutants
[DOE/EV-0008/1] N78-33626
User's guide for PAL A Guassian-plume algorithm for point, area, and line sources
[PB-281306/1] N78-33627
Effects of catalytic reactors on diesel exhaust composition
[PB-281083/6] N78-33628
California air pollution control laws --- health and safety code
[PB-281786/4] N78-33632
Design criteria for rocket exhaust scrubbers
[PB-282255/9] N78-33637
Inventory of combustion-related emissions from stationary sources
[PB-282428/2] N78-33638
Acoustic sounder array for application to air pollution. Volume 1: Executive summary and user guide
[PB-282064/5] N78-33670
Acoustic sounder array for application to air pollution. Volume 2: Case studies and other appendices
[PB-282065/2] N78-33671
The estimation of air concentrations due to the diffusion, deposition and resuspension of contaminants by the wind
N78-33674
Rain scavenging studies
[COO-1407-65] N78-33676
Effects of nitrogen dioxide on pulmonary function in human subjects
[PB-281186/7] N78-33723

AIR QUALITY
Rapid techniques for calculating the Pollution Standards Index [PSI]
[PB-282028/0] N78-33635

AIR SAMPLING
Sampling and analytical methodology for atmospheric particulate nitrates
[PB-281933/2] N78-33630

AIR TRAFFIC CONTROL
Parameters of future ATC systems relating to airport capacity/delay
[AD-A057059] N78-33068
System definition and investigation of the on site processing of en route sensor signals. Addendum: Investigation into possible en route on site beacon ring around discriminants
[AD-A056941] N78-33070
The FAA concept for a Beacon Collision Avoidance System [BCAS]. Volume 1: Executive summary
[AD-A056930] N78-33072
Engineering and development program plan: Discrete Address Beacon System [DABS]
[AD-A057122] N78-33073
Digitized radar data compressor --- for air traffic control
[AD-A057442] N78-33290
Two lightning-flash counter systems
[AD-A057369] N78-33655

AIR TRAFFIC CONTROLLERS [PERSONNEL]
Terminal radar interference criteria study --- air traffic controller performance
[AD-A057280] N78-33291

AIR TRANSPORTATION
Characteristics of future air cargo demand and impact on aircraft development: A report on the Cargo/Logistic Airlift Systems Study [CLASS] project
[NASA-TM-78774] N78-33061

AIR WATER INTERACTIONS
Stability of sparingly soluble monolayers at the air-water interface
N78-33378
A large scale ocean-atmosphere interaction model
N78-33675

AIRCRAFT ACCIDENT INVESTIGATION
Annual review of aircraft accident data, US general aviation, calendar year 1976
[PB-281330/1] N78-33064
Annual review of aircraft accident data, US air carrier operations, 1976
[PB-281329/3] N78-33065

AIRCRAFT ACCIDENTS
The analysis of National Transportation Safety Board small multiengine fixed-wing aircraft accident/incident reports for the potential presence of low-level wind shear
[AD-A056780] N78-33063
Annual review of aircraft accident data, US general aviation, calendar year 1976
[PB-281330/1] N78-33064
Annual review of aircraft accident data, US air carrier operations, 1976
[PB-281329/3] N78-33065

AIRCRAFT ANTENNAS
An airborne meteorological data collection system using satellite relay [ASDAR]
[NASA-TM-78992] N78-33283
Near field pattern computations for airborne antennas
[AD-A057244] N78-33311

AIRCRAFT APPROACH SPACING
Parameters of future ATC systems relating to airport capacity/delay
[AD-A057059] N78-33068

AIRCRAFT COMPARTMENTS
Ozone concentration in the cabin of a Gates Learjet measured simultaneously with atmospheric ozone concentrations
[NASA-TP-1340] N78-33618

AIRCRAFT CONFIGURATIONS
Aerodynamic derivatives for an oblique wing aircraft estimated from flight data by using a maximum likelihood technique
[NASA-TP-1336] N78-33054

AIRCRAFT DESIGN
Geometry requirements for unsteady aerodynamics in aeroelastic analysis and design
[NASA-TM-78781] N78-33046
Prospects for a civil/military transport aircraft
[NASA-TM-78724] N78-33060
Characteristics of future air cargo demand and impact on aircraft development: A report on the Cargo/Logistic Airlift Systems Study [CLASS] project
[NASA-TM-78774] N78-33061
The common case study: Lockheed design of a supersonic cruise vehicle
[NASA-CR-158935] N78-33086
Preliminary design characteristics of a subsonic business jet concept employing laminar flow control
[NASA-CR-158958] N78-33087
Wing planform geometry effects on large subsonic military transport airplanes
[AD-A056124] N78-33088
A data management system for weight control and design-to-cost
N78-33780

AIRCRAFT ENGINES
Results and status of the NASA aircraft engine emission reduction technology programs
[NASA-TM-79009] N78-33102
Evaluation of cyclic behavior of aircraft turbine disk alloys
[NASA-CR-159433] N78-33478

AIRCRAFT EQUIPMENT
Aircraft defogging and defrosting [transparent area]
[AD-A056976] N78-33694
An airborne meteorological data collection system using satellite relay [ASDAR]
[NASA-TM-78992] N78-33283

AIRCRAFT INSTRUMENTS
The FAA concept for a Beacon Collision Avoidance System [BCAS]. Volume 1: Executive summary
[AD-A056930] N78-33072
An aircraft radiometer front end, addendum
[NASA-CR-157777] N78-33405

AIRCRAFT LANDING
Vortex advisory system simulation of Chicago O'-Hare Airport
[AD-A057112] N78-33069

AIRCRAFT MAINTENANCE
Bell UH-1H RAM/LOG report
[AD-A057231] N78-33091

AIRCRAFT MANEUVERS
Hybrid computer study of the sensitivity of aircraft dynamics to aerodynamic cross-coupling
[SAND-77-1309C] N78-33121

AIRCRAFT NOISE
Annoyance due to the interaction of community noise sources
N78-33613
Commercial airport operations and community noise criteria
[AD-A057451] N78-33615
Airport noise. A bibliography with abstracts
[NTIS/PS-78/0807/4] N78-33639

AIRCRAFT SAFETY
Bird strikes and aviation safety. A bibliography with abstracts
[NTIS/PS-78/0694/6] N78-33066
Evaluation of seating and restraint systems and anthropomorphic dummies conducted during fiscal year 1977
[AD-A056905] N78-33737

AIRCRAFT STABILITY
Hybrid computer study of the sensitivity of aircraft dynamics to aerodynamic cross-coupling
[SAND-77-1309C] N78-33121

AIRFOILS
A comparative study of two computational methods for calculating unsteady transonic flows about oscillating airfoils
[AD-A056946] N78-33058

AIRFRAMES
Galvanic corrosion fatigue testing of 7075-T6 aluminum bonded with graphite-epoxy composite
[AD-A055714] N78-33197
Flaw growth in complex structure. Volume 1: Technical discussion
[AD-A056372] N78-33483

AIRLINE OPERATIONS
Airline delay trends, 1972-1977
[AD-A056867] N78-33062

AIRPORTS
Vortex advisory system simulation of Chicago O'-Hare Airport
[AD-A057112] N78-33069
Airport noise. A bibliography with abstracts
[NTIS/PS-78/0807/4] N78-33639

ALASKA
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 1: Executive summary
[AD-A056740] N78-33074
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 2: Analysis
[AD-A056741] N78-33075
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirements of CONUS, Alaska, and offshore. Volume 3: Supporting appendices
[AD-A056742] N78-33076
Lower Cook Inlet: Another example of more data needed for appraising outer continental shelf oil and gas resources --- resources management
[PB-281769/0] N78-33521
Land use planning issues and the Alaska gas pipeline: A report to the President
[PB-281327/7] N78-33522

ALCOHOLS
Department of Energy position paper on alcohol fuels
[DOE/US-0001/1] N78-33256
Process development studies on the bioconversion of cellulose and production of ethanol
[LBL-6881] N78-33260
Alcohol fuels. Citations from the NTIS data base
[NTIS/PS-78/0673/0] N78-33262
Alcohol fuels. Citations from the engineering index data base
[NTIS/PS-78/0674/8] N78-33263

ALGEBRA
A mathematical structure
N78-33824

ALGORITHMS
Missile aerodynamic parameter and structure identification from flight test data
[AD-A056343] N78-33055
On the detection of anomalous phase errors
N78-33067
Extensions of AHPL and optimization of the AHPL compiler for MSI/LSI design
N78-33333
Data acquisition systems applied to printed-wiring-board measurements
[SAND-78-8501] N78-33358
Mapping ultramafic rocks by computer analysis of digital LANDSAT data
N78-33504
Development of techniques for short-range precipitation forecasts
[AD-A057153] N78-33680
Optimization algorithms for computer aided design problems
N78-33769
A special purpose linear programming algorithm for obtaining least absolute value estimators in a linear model with dummy variables
[AD-A056762] N78-33796

Evaluating strategies for Newton's method using a numerically stable generalized inverse algorithm N78-33833
Sequential least squares estimation of slowly time-varying parameters --- applicable to digital signal processing N78-33834
Fault trees: Sensitivity of estimated failure probabilities to problem presentation [AD-A057163] N78-33837
The zonal matching problem N78-33867
A network augmenting path basic algorithm for transshipment problems [AD-A056761] N78-33869
On linear operations realizable in coherent optical processor N78-33910

ALKALI HALIDES
Luminescent decay and spectra of impurity-activated alkali halides under high pressure [COO-1198-1191] N78-33173
Effects of excess charge density on dielectric breakdown N78-33325

ALLOYS
Determination of the recovery stresses developed by shape memory alloys [LBL-6884] N78-33216
Compilation of fatigue data for Incoloy 800 alloys [ANL/MSD-78-3] N78-33217
Phonon scattering by dislocations N78-33949

ALPHA PARTICLES
Advances in alpha air monitoring instrumentation [LA-UR-78-1150] N78-33623
Fragmentation of relativistic light nuclei: Longitudinal and transverse momentum distributions N78-33902
The elastic and inelastic scattering of alpha particles by oxygen-16 N78-33906

ALTERNATING CURRENT
Interactive electronic circuit simulation on small computer systems with a real time algorithm for ac analysis N78-33808

ALUMINUM
Metal deformation modeling: Stress relaxation of aluminum [SAND-78-0164C] N78-33209
Catalog information on the performance of aluminum in sea water --- ocean thermal energy conversion [PNL-2606] N78-33211
Fast reactions of aluminum: A literature review [AD-A057215] N78-33633
Energy spectra of double-scattered photons N78-33904

ALUMINUM ALLOYS
Review of the low-temperature properties of metals: A digest of selected literature N78-33143
Review of the low-temperature properties of metals: A digest of selected literature N78-33144
Effect of microstructure on fatigue properties of Ti-6Al-4V N78-33189
High temperature cyclic deformation in nickel TD-nickel, and Al-4 percent Cu alloy aged to contain theta prime and theta double prime N78-33190
Low cycle corrosion fatigue and corrosion fatigue crack propagation of high strength 7000-type aluminum alloys N78-33191
Galvanic corrosion fatigue testing of 7075-T6 aluminum bonded with graphite-epoxy composite [AD-A055714] N78-33197
Electronic structure of ternary alloys --- iron-nickel-aluminum alloys [AD-A056356] N78-33198
Computer-aided design and manufacturing for extrusion of aluminum, titanium and steel structural parts. Phase 2: Application to practical extrusions. Volume 1: Description of CAD/CAM systems for extrusion of structural shapes [AD-A056965] N78-33200
Computer-aided design and manufacturing for extrusion of aluminum, titanium and steel structural parts. Phase 2: Application to practical extrusions. Volume 2: User's manual for ALEXTR system of computer programs for design and manufacture of flat-face dies for aluminum extrusion [AD-A056966] N78-33201
Investigation into the effects of weapon setback on various materials and geometries [AD-A057236] N78-33450

ALUMINUM OXIDES
Mechanical and thermal properties of sialon alumina composites N78-33146

AMAZON REGION [SOUTH AMERICA]
A plan for the collection and transmission of hydrometeorological data in the Brasilian Amazon basin [E78-10175] N78-33508

AMBIENCE
Development of nickel-free austenitic stainless steels for ambient and cryogenic applications [LBL-7397] N78-33223

AMBIPOLAR DIFFUSION
Kinetic transport properties of a bumpy torus with finite radial ambipolar field [ORNL/TM-6215] N78-33942

AMERICIUM 241
Nuclear electric power sources [NASA-TM-78789] N78-33538

AMORPHOUS MATERIALS
Magnetic properties of two dilute spin systems --- amorphous metals N78-33957

AMORPHOUS SEMICONDUCTORS
Amorphous semiconductors in photovoltaic and solar thermal conversion [BNL-24216] N78-33584

AMPLIFIER DESIGN
Optimized design of low-distortion monolithic wide-band amplifiers N78-33328
Characteristics of amplified spontaneous emissions in high-gain gas-laser amplifiers N78-33419

ANALOG CIRCUITS
An analog FFT beamformer for acoustic applications [AD-A057057] N78-33879

ANALOG DATA
Analog algebraic decoding of linear block codes N78-33768

ANALOG TO DIGITAL CONVERTERS
Instrumentation development of Raster scanning densitometer [AD-A056968] N78-33309
Conversion from film to magnetic cassette recording for current meter [AD-A056962] N78-33409

ANALOGS
Infrared spectra of lunar soil analogs --- spectral reflectance of minerals [NASA-CR-157742] N78-34020

ANALYSIS [MATHEMATICS]
Topics in computational geometry [SLAC-206] N78-33839
Mathematical analysis of effects of underwater sound-source motion on received total acoustic field N78-33872

ANALYSIS OF VARIANCE
A density-quantile function perspective on robust estimation [AD-A056707] N78-33861

ANGLE OF ATTACK
Hybrid computer study of the sensitivity of aircraft dynamics to aerodynamic cross-coupling [SAND-77-1309C] N78-33121

ANGLES [GEOMETRY]
Geometrical problems with a position sensitive detector employed on a diffractometer, including its use in the measurement of stress [AD-A056662] N78-33486

ANISOTROPIC PLATES
Flaw location and characterization in anisotropic materials by ultrasonic spectral analysis [CONF-780427-1] N78-33880

ANODES
Electrodeposition of nickel onto steel using a soluble mobile anode [K-1894] N78-33220
Lithium-boron alloy anodes for molten salt batteries [2] [AD-A057258] N78-33544

ANTARES ROCKET VEHICLE
LASL laser mirror program: Excerpts from 1/-12 Development Division [Y-DA-7591] N78-33436

ANTENNA ARRAYS
Phased array antenna amplifier exploratory development model [100 watts] [AD-A056173] N78-33301
Mutual coupling analysis in a finite planar rectangular waveguide antenna [AD-A056858] N78-33315

ANTENNA DESIGN
Near field pattern computations for airborne antennas [AD-A057244] N78-33311
Research and development of antennas for rockets and satellites [AD-A056710] N78-33349
Geosynchronous Microwave Atmospheric Sounding Radiometer [MASR] antenna feasibility study. Volume 3: Antenna feasibility [NASA-CR-156825] N78-33646

ANTENNA RADIATION PATTERNS
System definition and investigation of the on site processing of en route sensor signals. Addendum: Investigation into possible en route on site beacon ring around discriminants [AD-A056941] N78-33070
Near field pattern computations for airborne antennas [AD-A057244] N78-33311

ANTENNAS
Evaluation of a triaxial SQUID magnetometer designed for use as an ELF magnetic antenna [AD-A056361] N78-33293
Performance evaluation of simple HF antenna systems [AD-A057255] N78-33310

ANTHROPOMETRY
Anthropometry: Basic studies and applications, volume 2. A bibliography with abstracts [NTIS/PS-78/0866/0] N78-33726

ANTIFERROMAGNETISM
Magnetic properties of two dilute spin systems --- amorphous metals N78-33957

ANTIFRICTION BEARINGS
ASME report on chemical effects of lubrication in contact fatigue, volume 2 [PB-280980/4] N78-33245

ANTIMONY COMPOUNDS
Improved detectivity of pyroelectric detectors [NASA-CR-158917] N78-33406

APPLICATIONS OF MATHEMATICS
Mathematical analysis of stress cracks, volume 1. A bibliography with abstracts [NTIS/PS-78/0768/8] N78-33498

APPROXIMATION
A model calculation for the interaction of hydrogen with transition metals: H in Ni N78-33193
A mean spherical model for soft potentials: The hard core revealed as a perturbation [NASA-CR-157771] N78-33381
Some formal effects of nonlinearities in optimal perturbation control N78-33820
The approximation of plane curves by means of circular-arc-based elements N78-33829

AQUEOUS SOLUTIONS
Nuclear magnetic resonance relaxation in aqueous protein systems --- cross relaxation and relaxation time N78-33155
Vapor-liquid equilibria in multicomponent aqueous solutions of volatile electrolytes N78-33157
Sub-part-per-trillion detection of organics in aqueous solution by laser induced molecular fluorescence [UCRL-80038] N78-33174

ARCHITECTURE [COMPUTERS]
An experimental simultaneous multiprocessor organization N78-33748
Architecture for multiple instruction stream LSI processors [AD-A056110] N78-33751
Simulation studies of the database computer [DBC] [AD-A056048] N78-33753
Reference bibliography on operating system design issues for distributed systems [first release] [AD-A056560] N78-33813

ARGON
Theoretical study of the differential positronium cross section with helium and argon targets N78-33893

ARMED FORCES [UNITED STATES]
Encyclopedia of US Air Force aircraft and missile systems. Volume 1: Post-World War II fighters 1945 - 1973 [AD-A057002] N78-33036
Unstable resonators for Army laser designators [AD-A056432] N78-33430
Air Force aircrew training devices: Master plan [AD-A056940] N78-33734

ARROW WINGS
Effects of wing leading-edge deflection on the low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration [NASA-TM-78787] N78-33047

ARSENIDES
Heat pulse propagation characteristics in N-type In As [AD-A057243] N78-33970

ASPHALT
Thermoplastic rubber comprising ethylene-vinyl acetate copolymer, asphalt and fluxing oil [NASA-CASE-NPO-88351] N78-33228

ASTRONOMICAL OBSERVATORIES
Second high energy astronomy observatory launch set [NASA-NEWS-RELEASE-78-165] N78-33130

ASYMMETRY
Tectonic asymmetry of the earth and other planets [NASA-TM-75576] N78-33643

ATMOSPHERIC ATTENUATION
Spectrophone analysis of gas samples obtained at field site [AD-A057202] N78-33621

On the nature and distribution of solar radiation --- insolation and earth atmosphere effects
[HCP/T2552-01] N78-33667
ATMOSPHERIC BOUNDARY LAYER
An investigation of the boundary layer of an axisymmetric mesoscale vortex
[PB-282507/3] N78-33687
ATMOSPHERIC CIRCULATION
Energetics diagnosis of the NCAR general circulation model
[PB-281140/4] N78-33685
ATMOSPHERIC COMPOSITION
Ozone concentration in the cabin of a Gates Learjet measured simultaneously with atmospheric ozone concentrations
[NASA-TP-1340] N78-33618
Atmospheric and Geophysical Sciences Division, Physics Department program report, FY 1977
[UCRL-51444-77] N78-33624
Theoretical and experimental studies of the atmospheric sodium layer
[NASA-CR-157770] N78-33653
Are the stratospheric dust particles meteor ablation debris or interplanetary dust?
[NASA-TM-78507] N78-34014
ATMOSPHERIC DENSITY
Development, test, and calibration of a three-axis accelerometer system
[AD-A056711] N78-33408
ABRES pretest atmospheric measurements
[AD-A055285] N78-33657
ATMOSPHERIC MODELS
MAP3S: Studying the transport, transformation, and fate of atmospheric energy-related pollutants
[DOE/EV-0008/1] N78-33626
User's guide for PAL A Guassian-plume algorithm for point, area, and line sources
[PB-281306/1] N78-33627
Ionospheric refraction corrections in the GTDS for satellite-to-satellite tracking data
[NASA-CR-156834] N78-33654
Calculation of atmospheric composition in the high latitude September stratosphere
[AD-A055160] N78-33656
Acoustic sounder array for application to air pollution. Volume 1: Executive summary and user guide
[PB-282064/5] N78-33670
Acoustic sounder array for application to air pollution. Volume 2: Case studies and other appendices
[PB-282065/2] N78-33671
The estimation of air concentrations due to the diffusion, deposition and resuspension of contaminants by the wind
N78-33674
A large scale ocean-atmosphere interaction model
N78-33675
Rain scavenging studies
[COO-1407-65] N78-33676
Energetics diagnosis of the NCAR general circulation model
[PB-281140/4] N78-33685
ATMOSPHERIC MOISTURE
Remote sensing of atmospheric water vapor, liquid water and wind speed at the ocean surface by passive microwave techniques from the Nimbus-5 satellite
[NASA-TM-79568] N78-33512
ATMOSPHERIC SCATTERING
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, fall 1976
[AD-A057144] N78-33660
Theoretical study of background radiance in upper atmosphere
[AD-A057249] N78-33663
ATMOSPHERIC TEMPERATURE
Low-layer features of two limited-area hurricane regimes
[PB-283079/2] N78-33690
ATOMIC COLLISIONS
Experimental study of resonant electron transfer in He [+] [+] He and H [+] [+]H collisions at low relative velocities
N78-33888
Interactions of atoms with solid surface: Nonadiabatic mechanism for the production of excited state hydrogen and helium atoms at a metal surface
N78-33889
ATOMIC ENERGY LEVELS
Atomic energy levels: The rare earth elements [the spectra of lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, ebrium, thulium, ytterbium, and lutetium]
[PB-282067/8] N78-33901
ATOMIC EXCITATIONS
Investigations of resonance fluorescence --- quantum electrodynamics and Heisenberg theory
N78-33892
ATOMIC SPECTRA
Atomic energy levels: The rare earth elements [the spectra of lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, ebrium, thulium, ytterbium, and lutetium]
[PB-282067/8] N78-33901
Development and characterization of miniature inductively coupled plasma source for atomic emission spectrometry
[AD-A056139] N78-33932
ATOMIC STRUCTURE
Electronic structure of ternary alloys --- iron-nickel-aluminum alloys
[AD-A056356] N78-33198
AB initio LCAO/MO cluster-type calculation of the self consistent electronic screening charge density around a single hydrogen impurity in a nickel crystal
N78-33963
ATOMS
Study of improvement of hydrogen maser frequency standard
[NASA-CR-156836] N78-33425
ATS 6
ATS-6 flight accelerometers --- in-flight monitoring of spacecraft dynamic response
[NASA-TM-79847] N78-33096
ATTENUATION COEFFICIENTS
Measurement of absorption coefficients of water in the visible spectral region, phase 1 and 2
[PB-281500/9] N78-33182
ATTITUDE CONTROL
Nonlinear rolling motion analysis of a Canard-controlled missile configuration at angles of attack from 0 to 30 degrees in incompressible flow
[AD-A056695] N78-33132
Development and fabrication of a concentrating solar collector subsystem
[NASA-CR-150787] N78-33529
AURORAL ABSORPTION
The onset of an auroral absorption substorm
[REPT-24] N78-33649
Studies of the onset of an auroral absorption substorm
[REPT-26] N78-33650
AURORAL ZONES
Some properties of high latitude sporadic E
[REPT-29] N78-33651
AURORAS
Analysis of electron retarding potential analyzer measurements of vehicle skin potential in the PRECEDE experiment
[AD-A057250] N78-33347
AUSTENITIC STAINLESS STEELS
Localized corrosion and stress corrosion cracking behavior of austenitic stainless steel weldments containing retained ferrite
[COO-2462-4] N78-33213
Studies of microstructure-property relationships in austenitic stainless steels
[ORO-4044-7] N78-33218
Development of nickel-free austenitic stainless steels for ambient and cryogenic applications
[LBL-7397] N78-33223
AUTOMATIC CONTROL
The design and operation of an automated, high-efficiency photoionization mass spectrometer
[AD-A056269] N78-33412
Machine-readable identification system for library materials
[PB-282499/3] N78-33998
AUTOMATION
Computer automation on an electron-beam welder with automatic, stored seam tracking
[Y-2114] N78-33452
AUTOMOBILE ENGINES
Performance characteristics of automotive engines in the United States. Second series, Report No. 1: 1976 Chevrolet Vega 140 [CID [2.3 liters], 2V --- to determine fuel consumption and emissions
[PB-281774/0] N78-33455
Performance characteristics of automotive engines in the United States. Second series, report no. 2: 1976 Chevrolet 305 CID [5.0 liters], 2V --- to determine fuel consumption and emissions
[PB-281775/7] N78-33456
Performance characteristics of automotive engines in the United States. Second series, report no. 3: 1977 Chrysler 225 CID [3.7 liters], 2V --- to determine fuel consumption and emissions
[PB-281776/5] N78-33457
Performance characteristics of automotive engines in the United States. First series, report no. 12: 1975 Perkins diesel 247 CID [4.0 liters], FI --- to determine fuel consumption and emissions
[PB-281777/3] N78-33458
Performance characteristics of automotive engines in the United States. First series, report no. 13: 1975 American Motors, 258 CID [4.2 liters], 1V --- to determine fuel consumption and emissions
[PB-281778/1] N78-33459
Study of heat engine/flywheel: Hybrid propulsion configuration with electrical transmission system, phase 1
[ALO-4i/i] N78-33560
Passenger car fuel economy in short trip operation
[COO-4248-1] N78-33592
Evaluation of FIDC system --- fuel vapor injector/igniter and lean limit controller for automobile engines
[NASA-CR-157763] N78-34007
AUTOMOBILES
Solid State Data Acquisition and Processing System [SSDAPS]. Volume 3: Description, installation, calibration, and operating procedures --- for vehicle dynamics studies
[PB-282402/7] N78-33125
Fuel consumption: Transportation, volume 1. A bibliography with abstracts
[NTIS/PS-78/0707/6] N78-33599
Fuel consumption: Transportation, volume 2. A bibliography with abstracts
[NTIS/PS-78/0708/4] N78-33600
Vehicle integration and evaluation of advanced restraint systems. Restraint system analysis report
[PB-281475/4] N78-33744
Advanced program weight control system
N78-33779
AUTOMORPHISMS
Automorphism groups of free algebras and direct powers
N78-33825
AUTOPSIES
An interactive system for the generation of standardized autopsy protocols
N78-33773
AUXILIARY POWER SOURCES
Cycle life test --- of secondary spacecraft cells
[NASA-CR-156846] N78-33539
AVALANCHE DIODES
Studies of avalanche injection of charge into SiO2 using gated diode structures
N78-33326
Cost effective GaAs Read IMPATT transmitters
[AD-A056996] N78-33352
AVIONICS
System Avionics Value Estimation [SAVE]: An aid for avionics logistics-and-support-cost analyses
[AD-A056348] N78-33097
Standard modular power supplies for avionics
[AD-A057159] N78-33100
AXIAL FLOW TURBINES
Design and performance of a 427-meter-per-second-tip-speed two-stage fan having a 2.40 pressure ratio
[NASA-TP-1314] N78-33109

B

B-1 AIRCRAFT
B-1 EMUX automated logic diagrammer demonstration program
[AD-A056964] N78-33092
BACKGROUND NOISE
Annoyance due to the interaction of community noise sources
N78-33613
BACKGROUND RADIATION
Theoretical study of background radiance in upper atmosphere
[AD-A057249] N78-33663
BACTERIOLOGY
Biological water quality monitoring using chemiluminescent and bioluminescent techniques
[NASA-CR-156830] N78-33702
BAND STRUCTURE OF SOLIDS
Wavelength modulation spectroscopy of semiconductors
N78-33948
A model dielectric function for silicon
N78-33959
BASE PRESSURE
Development of base pressure similarity parameters for application to space shuttle launch vehicle power-on aerodynamic testing
[NASA-CR-150826] N78-33134
BASES [CHEMICAL]
Mass transport and acid-base generation in solution/membrane systems: Extension of Nernst-Planck treatment to electrolytic multicomponent systems
N78-33159
BAYES THEOREM
A methodology for nonlinear feature extraction in statistical pattern recognition
N78-33819
Bayesian reliability analysis of the alpha distributions with applications
N78-33847
The Bayesian multiple comparisons problems for uniform distrubutions and for translated exponential distributions
N78-33851
BEACON COLLISION AVOIDANCE SYSTEM
The FAA concept for a Beacon Collision Avoidance System [BCAS]. Volume 1: Executive summary
[AD-A056930] N78-33072
BEACONS
Engineering and development program plan: Discrete Address Beacon System [DABS]
[AD-A057122] N78-33073
BEAMS [SUPPORTS]
An evaluation of the sandwich beam in four-point bending as a compressive test method for composites
[NASA-TM-78783] N78-33153

BEARING ALLOYS
Long-term hot hardness characteristics of five through-hardened bearing steels
[NASA-TP-1341] N78-33196
Rolling element fatigue testing of gear materials
[NASA-CR-135450] N78-33463
BEARINGS
Ultrasonic lubrication
[AD-A056050] N78-33448
BENTONITE
The petrology of two late pliocene bentonites and the enclosing rocks, upper Siwalik Subgroup, northern Punjab and southwestern Kashmir, Pakistan
N78-33641
BENZENE
An experimental investigation of the critical supersaturation of five vapors in a shock tube --- Freon benzene, carbon tetrachloride, water and heavy water
[AD-A056859] N78-33172
BESSEL FUNCTIONS
User's manual for the BRL subroutine to calculate Bessel functions of integral order and complex argument
[AD-A056369] N78-33838
BETA PARTICLES
High beta capture and mirror confinement of laser produced plasmas --- electron cyclotron resonance heating
[COO-2277-10] N78-33946
BIBLIOGRAPHIES
Aeronautical engineering: A continuing bibliography with indexes, supplement 100
[NASA-SP-7037[100]] N78-33035
Bird strikes and aviation safety. A bibliography with abstracts
[NTIS/PS-78/0694/6] N78-33066
Closed loop control systems. Part 1: Aircraft. A bibliography with abstracts
[NTIS/PS-78/0809/0] N78-33122
X ray fluorescence analysis, volume 2. A bibliography with abstracts
[NTIS/PS-78/0722/5] N78-33185
Polycarboranes. A bibliography with abstracts
[NTIS/PS-78/0865/2] N78-33246
Polycarbonates: Properties, synthesis, and applications. A bibliography with abstracts
[NTIS/PS-78/0754/8] N78-33247
Alcohol fuels. Citations from the NTIS data base
[NTIS/PS-78/0673/0] N78-33262
Alcohol fuels. Citations from the engineering index data base
[NTIS/PS-78/0674/8] N78-33263
Electropolishing. Citations from the engineering index data base
[NTIS/PS-78/0712] N78-33275
Publication and services of the Cryogenics Division, National Bureau of Standards, 1953 - 1977
[PB-281465/5] N78-33276
Closed loop control systems. Part 2: Miscellaneous applications. A bibliography with abstracts
[NTIS/PS-78/0810/8] N78-33278
Tropospheric scatter communications. A bibliography with abstracts
[NTIS/PS-78/0718/3] N78-33322
Computer aided design of microcircuits. Citations from the engineering data base
[NTIS/PS-78/0822/3] N78-33361
Light emitting diodes, volume 2. A bibliography with abstracts
[NTIS/PS-78/0736/5] N78-33362
Ferrite microwave electronics, volume 3. A bibliography with abstracts
[NTIS/PS-78/0738/1] N78-33363
Drag reducing fluids. A bibliography with abstracts
[NTIS/PS-78/0730/8] N78-33402
Numerical methods in fluid flow problems, volume 3. A bibliography with abstracts
[NTIS/PS-78/0823/1] N78-33403
Numerical methods in fluid flow problems, volume 4. A bibliography with abstracts
[NTIS/PS-78/0824/9] N78-33404
Dye laser, volume 2. A bibliography with abstracts
[NTIS/PS-78/0872/8] N78-33439
Carbon dioxide lasers, volume 3. A bibliography with abstracts
[NTIS/PS-78/0896/7] N78-33440
Neodymium YAG lasers. A bibliography with abstracts
[NTIS/PS-78/0808/2] N78-33441
Inert gas welding, volume 2. Citations from the engineering index data base
[NTIS/PS-78/0904-VOL-2] N78-33460
Inert gas welding, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0905/6] N78-33461
Inert gas welding. Citations from the NTIS data base
[NTIS/PS-78/0903/1] N78-33462
Mathematical analysis of stress cracks, volume 1. A bibliography with abstracts
[NTIS/PS-78/0768/8] N78-33498
Remote sensing applied to hydrology. A bibliography with abstracts
[NTIS/PS-78/0792/8] N78-33523
Biomass energy success stories: A portfolio illustrating current economic uses of renewable biomass energy
[HCP/T0285-02] N78-33598
Fuel consumption: Transportation, volume 1. A bibliography with abstracts
[NTIS/PS-78/0707/6] N78-33599
Fuel consumption: Transportation, volume 2. A bibliography with abstracts
[NTIS/PS-78/0708/4] N78-33600
Fuel consumption: Industrial, residential, and general studies. Volume 1. A bibliography with abstracts
[NTIS/PS-78/0709/2] N78-33601
Fuel consumption: Industrial, residential, and general studies. Volume 2. A bibliography with abstracts
[NTIS/PS-78/0710/0] N78-33602
Lithium batteries, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0660/7] N78-33603
Lithium batteries. Citations from the engineering index data base
[NTIS/PS-78/0661/5] N78-33604
Lead batteries. Citations from the NTIS data base
[NTIS/PS-78/0689/6] N78-33605
Lead batteries. Citations from the engineering index data base
[NTIS/PS-78/0690/4] N78-33606
Heliostat systems design and operation. Citations from the engineering index data base
[NTIS/PS-78/0842/1] N78-33608
Solar energy concentrator design and operation. Citations from the engineering index data base
[NTIS/PS-78/0839/7] N78-33609
Flat plate solar collector design and performance. Citations from the engineering index data base
[NTIS/PS-78/0841/3] N78-33610
Urban noise pollution. A bibliography with abstracts
[NTIS/PS-78/0686/2] N78-33634
Airport noise. A bibliography with abstracts
[NTIS/PS-78/0807/4] N78-33639
Fog prediction. A bibliography with abstracts
[NTIS/PS-78/0775/3] N78-33694
Gulf Stream. A bibliography with abstracts
[NTIS/PS-78/0844/7] N78-33700
Cryobiology. A bibliography with abstracts
[NTIS/PS-78/0678/9] N78-33707
Hyperbaric oxygenation. A bibliography with abstracts
[NTIS/PS-78/0676/3] N78-33724
Anthropometry: Basic studies and applications, volume 2. A bibliography with abstracts
[NTIS/PS-78/0866/0] N78-33726
An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance
[AD-A057113] N78-33733
Computer information security and protection, volume 1. Citations from the NTIS data base
[NTIS/PS-78/0859/5] N78-33763
Computer information security and protection, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0860/3] N78-33764
Computer information security and protection. Citations from the engineering index data base
[NTIS/PS-78/0861/1] N78-33765
Structured programming. A bibliography with abstracts
[NTIS/PS-78/0688/8] N78-33806
Reference bibliography on operating system design issues for distributed systems [first release]
[AD-A056560] N78-33813
Geothermal energy. Part 1: Exploration, volume 3. Citations from NTIS data base
[NTIS/PS-78/0664/9] N78-33881
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0665/6] N78-33882
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0666/4] N78-33883
Geothermal energy, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0667/2] N78-33884
Acoustic holography. Citations from the NTIS data base
[NTIS/PS-78/0700/1] N78-33885
Acoustic holography. Citations from the engineering index data base
[NTIS/PS-78/0701/9] N78-33886
Fiber optics, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0713/4] N78-33918
Fiber optics, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0714/2] N78-33919
Fiber optics, volume 2. Citations from the engineering index data base
[NTIS/PS-78/0715/9] N78-33920
Fiber optics, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0716/7] N78-33921
Infrared upconversion. A bibliography with abstracts
[NTIS/PS-78/0670/6] N78-33922
Liquid crystals. A bibliography with abstracts
[NTIS/PS-78/0767/0] N78-33974
BIMETALS
Methanation catalysts: Activity, adsorption and degradation studies of nickel and nickel bimetallic catalysts for methanation
N78-33161
BINAURAL HEARING
The effort of noise exposure on the masking level difference
N78-33709
BINOCULAR VISION
Hysteresis in human binocular fusion: A second look
N78-33711
BIOASSAY
X-ray analysis of biological specimens
[UR-3490-1341] N78-33704
BIOASTRONAUTICS
Biological experiments on board Salyut-6
N78-34032
BIODEGRADATION
A recycled-water sanitary waste disposal system
N78-34004
BIOELECTRIC POTENTIAL
The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain
N78-33701
BIOENGINEERING
Cryobiology. A bibliography with abstracts
[NTIS/PS-78/0678/9] N78-33707
Tissue identification by ultrasound
[NASA-CR-157776] N78-33716
BIOLOGICAL EFFECTS
Biological effects of high strength electric fields on small laboratory animals
[HCP/T1830-03] N78-33706
Compilation and assessment of microwave bioeffects, AO-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system
[PNL-2634] N78-33720
Electrical and biological effects of transmission lines: A review
[BPA-BIO-77-1] N78-33722
Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation
[JPRS-71910] N78-33727
Biomedical effects of millimeter radio waves
N78-33729
The combined effect of an SHF field and an unfavorable microclimate on the body
N78-33730
BIOLUMINESCENCE
Biological water quality monitoring using chemiluminescent and bioluminescent techniques
[NASA-CR-156830] N78-33702
BIOMASS
Fuels from sugar crops
[TID-28191] N78-33259
Biomass energy success stories: A portfolio illustrating current economic uses of renewable biomass energy
[HCP/T0285-02] N78-33598
BIRD-AIRCRAFT COLLISIONS
Bird strikes and aviation safety. A bibliography with abstracts
[NTIS/PS-78/0694/6] N78-33066
BIREFRINGENCE
Streaming birefringence in extensional flow of polymer solutions
N78-33365
BIREFRINGENT COATINGS
Dielectric and optical properties of thin films --- birefrigent coatings
[AD-A056822] N78-33971
BLOCK DIAGRAMS
On block relaxation techniques
[AD-A056749] N78-33754
Analog algebraic decoding of linear block codes
N78-33768
BLOCKING
A numerical study of upstream blocking and internal waves in a density stratified fluid
N78-33370
BLOOD
Relationship between osmotic pressure of the blood and secretion of sweat
[NASA-TM-75461] N78-33703
The preventive role of ultraviolet radiation during exposure to ionizing radiation
[NASA-TM-75106] N78-33710
BLUE GREEN ALGAE
Photoproduction of hydrogen by marine blue-green algae
[PB-280995/2] N78-33264

BLUFF BODIES
Interference effects on the drag of bluff bodies in tandem
N78-33038

BODIES OF REVOLUTION
Thick axisymmetric boundary layer and near wake of a low-drag body of revolution
[AD-A057158] N78-33057

BOEING 727 AIRCRAFT
TRSB microwave landing system demonstration program at Shiraz, Iran
[AD-A055526] N78-33071

BOLOMETERS
Improved detectivity of pyroelectric detectors
[NASA-CR-158917] N78-33406

BOMBER AIRCRAFT
B-1 EMUX automated logic diagrammer demonstration program
[AD-A056964] N78-33092

BORON ALLOYS
Lithium-boron alloy anodes for molten salt batteries [2]
[AD-A057258] N78-33544

BOUNDARY LAYER CONTROL
Preliminary design characteristics of a subsonic business jet concept employing laminar flow control
[NASA-CR-158958] N78-33087

BOUNDARY LAYER FLOW
Theory, computer program, and illustrative examples for the two-dimensional boundary layer flow of ideal gases
[AD-A056308] N78-33390
Numerical methods in fluid flow problems, volume 3. A bibliography with abstracts
[NTIS/PS-78/0823/1] N78-33403
Numerical methods in fluid flow problems, volume 4. A bibliography with abstracts
[NTIS/PS-78/0824/9] N78-33404

BOUNDARY LAYER SEPARATION
Viscous entrainment of mass and energy in fluid dynamic energy separation
N78-33376

BOUNDARY LAYER TRANSITION
Experimental analysis and computation of the onset and development of the boundary layer transition
[NASA-TM-75325] N78-33041

BRAIN CIRCULATION
The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain
N78-33701

BRAZIL
Development of heavily vegetated area in Brazil
[E78-10157] N78-33507
A plan for the collection and transmission of hydrometeorological data in the Brasilian Amazon basin
[E78-10175] N78-33508

BREADBOARD MODELS
Description of a model for evaluating operational performance of communications system
[AD-A057199] N78-33313

BREAKDOWN
Effects of excess charge density on dielectric breakdown
N78-33325

BRIGHTNESS
The effects of changes in flare in intensity on the recognition probability of vehicular size targets
[AD-A057238] N78-33253

BRILLOUIN EFFECT
Brillouin scattering from tungsten bronze materials
N78-33955

BRILLOUIN ZONES
Rayleigh-Brillouin scattering and structural relaxation of a viscoelastic liquid
[AD-A056763] N78-33389

BROADBAND AMPLIFIERS
Optimized design of low-distortion monolithic wideband amplifiers
N78-33328

BRONZES
Brillouin scattering from tungsten bronze materials
N78-33955

BUBBLE TECHNIQUE
Magnetic bubble domain wall dyanmics in gradient translation
N78-33334

BUBBLES
A study on thermoplastic structural foam --- dynamics of gas bubbles
N78-33229
Analytical studies of steady and non-steady motions of a bubbly liquid
N78-33375

BUFFETING
An investigation of wing buffeting response at subsonic and transonic speeds: Phase 1: F-111A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152109] N78-33113
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152110] N78-33114
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152111] N78-33115
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2 F-3A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152112] N78-33116
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152113] N78-33117
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152114] N78-33118

BUILDINGS
Optimum fatigue resistant frames for random base excitation
N78-33477
Design package for a complete residential solar space heating and hot water system
[NASA-CR-150795] N78-33531
Commercial demand for energy: A disaggregated approach
[ORNL/CON-15] N78-33570
Noise-induced building vibrations caused by concorde and conventional aircraft operations at Dulles and Kennedy International Airports
[NASA-TM-78769] N78-33874

BUREAUS [ORGANIZATIONS]
Science on its way to work: Activities of the National Bureau of Standards
[PB-282044/7] N78-34000

C

CABIN ATMOSPHERES
Ozone concentration in the cabin of a Gates Learjet measured simultaneously with atmospheric ozone concentrations
[NASA-TP-1340] N78-33618

CABLES [ROPES]
Design and development of helicopter external cargo sling legs made with Kevlar
[AD-A056951] N78-33093
Report on work performed under P. O. 9667503, task 2
[UCRL-13829] N78-33268

CADMIUM
Survey of the occurrence of mercury, lead, and cadmium in the Washington, D. C. area
[PB-281725/2] N78-33629

CADMIUM SULFIDES
Electro-optical studies
[AD-A057062] N78-33169

CALCIUM
Forced-flow chromatographic determination of calcium and magnesium with continuous spectrophotometric detection
[IS-T-806] N78-33179

CALCIUM COMPOUNDS
Calcium chromate synthesis: Process variables study
[GEPP-372] N78-33176

CALDERAS
Radar observations of a volcanic terrain: Askja Caldera, Iceland
[NASA-CR-157765] N78-33645

CALIFORNIA
Regional flood analyses and land use planning in an area of inadequate data Santa Cruz County, California
N78-33501
California air pollution control laws --- health and safety code
[PB-281786/4] N78-33632
San Diego wheelchair accessible bus study
[PB-281087/7] N78-34010

CAMERAS
Dust adhesion on Viking lander camera window
[NASA-TM-78782] N78-33407

CANADA
Canada in space
N78-33126

CANARD CONFIGURATIONS
Aerodynamic load distributions at transonic speeds for a close-coupled wing-canard configuration: Tabulated pressure data
[NASA-TM-78780] N78-33045
Subsonic dynamic stability characteristics of two close-coupled canard-wing configurations
[NASA-TP-1291] N78-33050
Nonlinear rolling motion analysis of a Canard-controlled missile configuration at angles of attack from 0 to 30 degrees in incompressible flow
[AD-A056695] N78-33132

CANTILEVER BEAMS
An approximate solution for the free vibrations of rotating uniform cantilever beams
[NASA-TM-X-62299] N78-33289

CARBON
Thermodynamics of carbon in nickel-based multicomponent solid solutions
[ORNL/TM-6282] N78-33206
Temperature dependence of hydrogen sputtering of carbon coatings on platinum
[GA-A-14608] N78-33221
Nuclear pumping of a neutral carbon laser
[COO-2007-94] N78-33434
Nuclear pumping of a neutral carbon laser
[NASA-CR-157728] N78-33435

CARBON DIOXIDE LASERS
A theoretical investigation of signal acquisition and digital communication in a coupling-modulated carbon dioxide laser system
N78-33422
Carbon dioxide lasers, volume 3. A bibliography with abstracts
[NTIS/PS-78/0896/7] N78-33440
Optical gain in optically pumped methanol and its application to a FIR preamplifier
N78-33912

CARBON FIBER REINFORCED PLASTICS
Moisture diffusion in fiber reinforced composites --- graphite-epoxy composites
[AD-A056557] N78-33154

CARBON MONOXIDE
A theoretical study on oxidative catalytic monoliths --- carbon monoxide oxidation and mass and heat transport
N78-33158
Liquids from CO and H2 for energy storage
[EPRI-AF-689] N78-33175
Thermal conversion of oil-shale kerogen using CO and water at elevated pressures
[LERC-78/1] N78-33552

CARBON STEELS
Crack tip plasticity associated with corrosion-assisted fatigue --- carbon steels
[AD-A056860] N78-33487

CARBON TETRACHLORIDE
An experimental investigation of the critical supersaturation of five vapors in a shock tube --- Freon benzene, carbon tetrachloride, water and heavy water
[AD-A056859] N78-33172

CARBONATES
Polycarbonates: Properties, synthesis, and applications. A bibliography with abstracts
[NTIS/PS-78/0754/8] N78-33247

CARBONYL COMPOUNDS
Coal desulfurization
[NASA-CASE-NPO-14272-1] N78-33164
Formation of iron carbonyl between a 1/2% Mo steel and high-pressure gases containing carbon monoxide
[ORNL-5410] N78-33215

CARBORANE
Polycarboranes. A bibliography with abstracts
[NTIS/PS-78/0865/2] N78-33246

CARDIOVASCULAR SYSTEM
Compilation and assessment of microwave bioeffects, AO-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system
[PNL-2634] N78-33720

CARGO AIRCRAFT
Characteristics of future air cargo demand and impact on aircraft development: A report on the Cargo/Logistic Airlift Systems Study [CLASS] project
[NASA-TM-78774] N78-33061

CARRIER FREQUENCIES
Comparative studies of the steady state and RF properties of proximity effect bridges
N78-33961

CASCADE RANGE [CA-OR-WA]
Relationships of clay mineralogy to landscape stability in Western Oregon
N78-33500

CASE HISTORIES
Acoustic sounder array for application to air pollution. Volume 2: Case studies and other appendices
[PB-282065/2] N78-33671

CASSEGRAIN ANTENNAS
Geosynchronous Microwave Atmospheric Sounding Radiometer [MASR] antenna feasibility study. Volume 3: Antenna feasibility
[NASA-CR-156825] N78-33646

CASTING
Machine casting of ferrous alloys
[AD-A056824] N78-33204

CATALYSIS
A theoretical study on oxidative catalytic monoliths --- carbon monoxide oxidation and mass and heat transport
N78-33158

CATALYSTS
Methanation catalysts: Activity, adsorption and degradation studies of nickel and nickel bimetallic catalysts for methanation
N78-33161

Influence of dispersed refractory oxides in retarding catalyst sintering
[EPRI-EM-624] N78-33214
Catalyst sintering studies --- phosphoric acid fuel cells
[EPRI-EM-661] N78-33577
CATALYTIC ACTIVITY
Catalytic conversion of solvent refined coal to liquid products
[LBL-6807] N78-33258
CAVITIES
Multiple cavity laser holographic system
[SAND-78-0496] N78-33417
CAVITY RESONATORS
Unstable resonator retrofitted handheld laser designator
[AD-A057248] N78-33432
CDC 6600 COMPUTER
Container cushioning design engineer users manual: CDC-6600 FORTRAN version, volume 2
[AD-A057245] N78-33451
CELLS [BIOLOGY]
Volume-restricted freezing of living cells and tissues
[ORNL/MIT-265] N78-33705
Physical mechanisms for biological effects of ultrasound
[PB-282234/4] N78-33725
Cellular and molecular effects and the mechanism of action of microwave electromagnetic fields on biological systems
N78-33728
CELLULOSE
Conversion of cellulosic and waste polymer material to gasoline
[COO-2982-21] N78-33257
Process development studies on the bioconversion of cellulose and production of ethanol
[LBL-6881] N78-33260
CEMENTS
Applications of thermal energy storage in the cement industry
[NASA-CR-159399] N78-33537
CENTRAL PROCESSING UNITS
Automation of module set independent register-transfer level design
N78-33332
CERAMICS
Mechanical and thermal properties of sialon alumina composites
N78-33146
Microstructurally developed toughening mechanisms in ceramics. Stress-induced martensitic reactions. 1: Theory of metastable phase retention and contribution to fracture toughness
[AD-A057239] N78-33231
Microstructurally developed toughening mechanisms in ceramics. Fracture toughness of Si3N4 as a function of the initial alpha-phase content
[AD-A057241] N78-33233
Microstructurally developed toughening mechanisms in ceramics. Compressive surface stresses developed in ceramics by an oxidation-induced phase change
[AD-A057242] N78-33234
Nondestructive evaluation techniques for high-temperature ceramic components
[ANL/MSD-78-5] N78-33240
High temperature properties and processes in ceramics: Thermomigration
[COO-2923-02] N78-33241
Ceramics technology readiness development program. Phase 1: Conceptual designs and material screening --- erosion/corrosion resistance
[FE-2786-12] N78-33243
CESIUM
Time-resolved production and detection of reactive atoms
N78-33895
CHANNEL FLOW
A theoretical study on oxidative catalytic monoliths --- carbon monoxide oxidation and mass and heat transport
N78-33158
CHANNELS [DATA TRANSMISSION]
A cost benefit analysis of proposed Federal input/output channel level computer interface standards
[PB-282406/8] N78-33761
Source and channel coding theory
N78-33767
CHARACTER RECOGNITION
Feature extraction in an adaptive multiclass pattern recognition system
N78-33818
Machine-readable identification system for library materials
[PB-282499/3] N78-33998
CHARGE COUPLED DEVICES
Charge-coupled scanned IR imaging sensors
[AD-A057115] N78-33916
CHARGE DISTRIBUTION
AB initio LCAO/MO cluster-type calculation of the self consistent electronic screening charge density around a single hydrogen impurity in a nickel crystal
N78-33963
CHARGE EXCHANGE
Theoretical study of the differential positronium cross section with helium and argon targets
N78-33893
CHARGE TRANSFER
Studies of avalanche injection of charge into SiO2 using gated diode structures
N78-33326
CHARGED PARTICLES
Particle acceleration in pulsar magnetospheres
[NASA-CR-157768] N78-34015
CHARPY IMPACT TEST
Computer simulation of plastic deformation in the Charpy V-notch impact test
[UCRL-80868] N78-33491
CHELATES
Separation of metal ions using an o-hydroxypropiophenoxime resin
[IS-T-801] N78-33178
CHEMICAL ANALYSIS
Pulsed positive negative ion chemical ionization mass spectrometry
N78-33156
Computational study of physical and chemical flame inhibition
[LBL-6899] N78-33181
Analysis of impurities in composition B by thin layer chromatography
[AD-A056313] N78-33255
Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 2
[AD-A056312] N78-33719
CHEMICAL ATTACK
ASME report on chemical effects of lubrication in contact fatigue, volume 2
[PB-280980/4] N78-33245
CHEMICAL COMPOSITION
Mass transport and acid-base generation in solution/membrane systems: Extension of Nernst-Planck treatment to electrolytic multicomponent systems
N78-33159
Cleavage behavior as a function of composition for single crystals of the Mo-Nb system
[COO-3476-15] N78-33972
CHEMICAL ENGINEERING
Limits to energy conservation in chemical processes
[ORAU/IEA-78-6[M]] N78-33550
CHEMICAL FUELS
Contribution of chemistry to energy
[LA-UR-78-706] N78-33559
CHEMICAL PROPERTIES
Lithium literature review: Lithium's properties and interactions
[HEDL-TME-78-15] N78-33180
Polycarbonates: Properties, synthesis, and applications. A bibliography with abstracts
[NTIS/PS-78/0754/8] N78-33247
CHEMICAL REACTIONS
Hydridocyclophosphazenes: Synthesis via organocopper reagents
[AD-A056094] N78-33168
Lithium literature review: Lithium's properties and interactions
[HEDL-TME-78-15] N78-33180
Effect of ultrasonic waves on the kinetics of polymerization
N78-33226
Journal of Research of the National Bureau of Standards. Volume 83, No. 1, January - February 1978
[PB-281311/1] N78-33274
Experimental study of chemically reacting turbulent free shear layers
[FE-2446-4] N78-33398
CHEMICAL REACTORS
Lithium literature review: Lithium's properties and interactions
[HEDL-TME-78-15] N78-33180
Use of microwave energy in conjunction with fluidized bed reactors
[CONF-771125-3] N78-33588
CHEMICAL TESTS
Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 1
[AD-A056311] N78-33718
CHEMILUMINESCENCE
Studies of electrogenerated chemiluminescence
N78-33162
Biological water quality monitoring using chemiluminescent and bioluminescent techniques
[NASA-CR-156830] N78-33702
CHEMISTRY
Information transfer and use in chemistry
[BLL-BLRDR-5385] N78-34001
CHLORIDES
Electrochemical reduction of thionyl chloride in solutions containing lithium tetrachloroaluminate
[AD-A056123] N78-33167
CHLORINE
Development of high-efficiency cost-effective, zinc-chlorine batteries for utility peak-shaving, 1976
[EPRI-EM-711] N78-33590
An investigation of radiative lifetimes and oscillator strengths for allowed intra L-shell transitions in multiply-charged chlorine ions
N78-33958
CHROMATES
Calcium chromate synthesis: Process variables study
[GEPP-372] N78-33176
CHROMATOGRAPHY
Forced-flow chromatographic determination of calcium and magnesium with continuous spectrophotometric detection
[IS-T-806] N78-33179
CHROMIUM
Contingency plans for chromium utilization. Publication NMAB-335
[NASA-CR-157789] N78-33207
CHROMIUM ALLOYS
Study of the effects of several variables on the thermal conductivity of 2 1/4 Cr-1 Mo steel
[ORNL-5313] N78-33219
CIRCUIT BOARDS
Measurements of dimensional and electrical characteristics of printed boards made with IPC Multi-Purpose Test Pattern, B-25
[SAND-77-1837C] N78-33357
CIRCULAR CYLINDERS
A visual investigation of turbulence in stagnation flow about a circular cylinder
[NASA-CR-3019] N78-33386
High frequency behavior of source excited concave surfaces
N78-33475
CIRCULAR TUBES
Forced flow laminar filmwise condensation of a pure saturated vapor in a vertical tube
N78-33367
CIVIL AVIATION
Airline delay trends, 1972-1977
[AD-A056867] N78-33062
Annual review of aircraft accident data, US air carrier operations, 1976
[PB-281329/3] N78-33065
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 1: Executive summary
[AD-A056740] N78-33074
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 2: Analysis
[AD-A056741] N78-33075
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirements of CONUS, Alaska, and offshore. Volume 3: Supporting appendices
[AD-A056742] N78-33076
CLASSIFICATIONS
Mapping ultramafic rocks by computer analysis of digital LANDSAT data
N78-33504
CLASSIFIERS
Clustering and classification of discrete data
N78-33846
CLAYS
Relationships of clay mineralogy to landscape stability in Western Oregon
N78-33500
CLEANING
Surface cleaning in thin film technology
[SAND-77-1716C] N78-33269
CLEAVAGE
Cleavage behavior as a function of composition for single crystals of the Mo-Nb system
[COO-3476-15] N78-33972
CLIMATE
Climate forecast verification via multinomial stochasters
[AD-A056920] N78-33681
CLIMATOLOGY
A large scale ocean-atmosphere interaction model
N78-33675
Tailored climatology of severe weather --- computerized simulation
[AD-A056988] N78-33679
CLOUD COVER
Specification of cloud cover using multispectral satellite radiometric data
[PB-281160/2] N78-33686
CLOUD SEEDING
Initial development of a tactical system for dispersing supercooled stratus
[AD-A056570] N78-33677
CLOUDS [METEOROLOGY]
Remote sounding of cloud compositions from NOAA 4 and Nimbus 6 infrared sounders
[AD-A056852] N78-33683
An assessment of synoptic criteria for ice multiplication in convective clouds
[PB-281079/4] N78-33684
COAL
Coal desulfurization
[NASA-CASE-NPO-14272-1] N78-33164
Hot corrosion/erosion testing of materials for applications for advanced power conversion systems using coal-derived fuels. Task 2. Evaluation of turbine

materials for use in a coal-fired fluidized bed combustion environment
[FE-2326-20] N78-33210
COAL GASIFICATION
Significance of process variables on liquid effluent production in coal gasification
N78-33525
COAL LIQUEFACTION
Catalytic conversion of solvent refined coal to liquid products
[LBL-6807] N78-33258
Symposium proceedings: Environmental aspects of fuel conversion technology, 3
[PB-282429/0] N78-33636
COAL UTILIZATION
Coal fired prototype high temperature continuous flow heat exchanger. AF-684 research project 545-1
[EPRI-AF-684] N78-33391
Projects to expand fuel sources in Eastern states: An update of Information Circular 8725. Survey of Planned or proposed coal mines, coal and noncoal conversion plants, electric generating plants, oil refineries, uranium enrichment facilities, and related infrastructure, in states east of the Mississippi River [as of July 1977]
[BM-IC-8765] N78-33581
COASTAL PLAINS
A Nimbus G pre-launch field experiment in the Gulf of Mexico, October 1977
[NASA-CR-157786] N78-33509
COASTAL WATER
Light hydrocarbons in marine sediments --- Texas-Louisiana coastal shelve region
N78-33614
COAXIAL CABLES
Propagating modes on a buried leaky coaxial cable
[AD-A057253] N78-33308
CODES
Electron transport code theoretical basis
[LA-7227-MS] N78-33900
CODING
Project RMAG: Symbolic logic retrieval source code
[PB-281373/1] N78-33979
COGNITION
An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance
[AD-A057113] N78-33733
COHERENCE
Investigations of the coherence properties of a ring laser
N78-33421
Performance, evaluation, and specification for coherent optical processors
N78-33911
COHERENT ELECTROMAGNETIC RADIATION
Stimulated Raman scattering involving two plasma waves
[AD-A056855] N78-33936
COLD FLOW TESTS
Dual throat thruster cold flow analysis
[NASA-CR-150822] N78-33142
COLLISIONLESS PLASMAS
Two problems involving imperfect conductivity in a collisionless plasma
N78-33929
Monotone steady-state potential distributions in the standard collisionless plane diode model of the single-ended Q-machine --- thermionic converters
[UNICP-FSP-78/1] N78-33931
COLUMNS [SUPPORTS]
Telescoping columns --- parabolic antenna support
[NASA-CASE-LAR-12195-1] N78-33446
Structural efficiency of long lightly loaded truss and isogrid columns for space applications
[NASA-TM-78687] N78-33480
COMBUSTION
Pollution Reduction Technology Program for small jet aircraft engines, phase 2
[NASA-CR-159415] N78-33104
Detailed models of hydrocarbon combustion
[UCRL-80896] N78-33177
Computational study of physical and chemical flame inhibition
[LBL-6899] N78-33181
Application of impedance tube technique in the measurement of burning solid propellant admittances
N78-33248
COMBUSTION CHAMBERS
Hot corrosion/erosion testing of materials for applications for advanced power conversion systems using coal-derived fuels. Task 2. Evaluation of turbine materials for use in a coal-fired fluidized bed combustion environment
[FE-2326-20] N78-33210
COMBUSTION EFFICIENCY
Passenger car fuel economy in short trip operation
[COO-4248-1] N78-33592
COMBUSTION PRODUCTS
New techniques for the analysis of thermolysis products
N78-33163
The nature and formation of nitrogenous air pollutant emissions from combustion systems
N78-33611
MAP3S: Studying the transport, transformation, and fate of atmospheric energy-related pollutants
[DOE/EV-0008/1] N78-33626
Effects of catalytic reactors on diesel exhaust composition
[PB-281083/6] N78-33628
Inventory of combustion-related emissions from stationary sources
[PB-282428/2] N78-33638
COMET NUCLEI
Preliminary studies of electromagnetic sounding of cometary nuclei
[NASA-CR-157764] N78-34022
COMMERCE
Science on its way to work: Activities of the National Bureau of Standards
[PB-282044/7] N78-34000
COMMERCIAL AIRCRAFT
Airline delay trends, 1972-1977
[AD-A056867] N78-33062
Comparison of low-frequency noise levels of the Concorde supersonic transport with other commercial service airplanes
[NASA-TM-78736] N78-33873
COMMERCIAL ENERGY
Energy efficiency and electric motors
[HCP/M50217-01] N78-33591
COMMUNICATING
Systems analysis of scientific and technical communication in the United States: The electronic alternative to communication through paper-based journals
[PB-281847/4] N78-33986
Systems analysis of scientific and technical communication in the United States. Annex 1: Communication functions in science and technology
[PB-281848/2] N78-33987
Systems analysis of scientific and technical communication in the United States: Annex 2: The current practices
[PB-281849/0] N78-33988
Systems analysis of scientific and technical communication in the United States. Annex 3: An electronic alternative
[PB-281850/8] N78-33989
Systems analysis of scientific and technical communication in the United States. Annex 4: The cost model
[PB-281851/6] N78-33990
COMMUNICATION
An airborne meteorological data collection system using satellite relay [ASDAR]
[NASA-TM-78992] N78-33283
Binary sequences for spread-spectrum multiple-access communication
[AD-A056552] N78-33297
An investigation of the possible uses of the normal mode helical antenna in the tactical army
[AD-A056324] N78-33314
A theoretical investigation of signal acquisition and digital communication in a coupling-modulated carbon dioxide laser system
N78-33422
COMMUNICATION NETWORKS
Measures of congestion for computer communication networks
N78-33811
Data Network Referee [DNR] concept report
[AD-A056960] N78-33814
COMMUNICATION SATELLITES
A depolarization and attenuation experiment using the COMSTAR and CTS satellites
[NASA-CR-156848] N78-33287
The feasibility of employing frequencies between 20 and 300 GHz for earth-statellite communications links
[AD-A056100] N78-33300
Organizing to use a new telecommunications technology: Communications satellites and vocational rehabilitation
[PB-282283/1] N78-33323
Minimum antenna dimensions for satellite-communication earth stations
[PB-282109/8] N78-33324
The 9438 low level traveling wave amplifier anomaly, revision A
[AD-A056714] N78-33344
COMMUNICATIONS TECHNOLOGY SATELLITE
Thermal characteristics of the 12-gigahertz, 200-watt output stage tube for the communications technology satellite
[NASA-TP-1344] N78-33137
COMPILERS
Extensions of AHPL and optimization of the AHPL compiler for MSI/LSI design
N78-33333
COMPONENTS
Pulsed holographic analysis of large vibrating vehicle components
[AD-A056439] N78-33410
COMPOSITE MATERIALS
Review of the low-temperature properties of metals: A digest of selected literature
N78-33143
Analysis of elastic behavior of orthotropic wood composite plates
N78-33145
Mechanical and thermal properties of sialon alumina composites
N78-33146
An evaluation of the sandwich beam in four-point bending as a compressive test method for composites
[NASA-TM-78783] N78-33153
Interactive composite joint design. Part 2: User's manual
[AD-A056712] N78-33449
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0665/6] N78-33882
COMPOSITE STRUCTURES
Analysis/design of strip reinforced random composites [strip hybrids]
[NASA-TM-78985] N78-33149
Acoustic emission testing of composite vessels under sustained loading
[NASA-TM-78981] N78-33150
COMPRESSED AIR
Compressed air energy storage advanced systems analysis
[PNL-2464] N78-33545
COMPRESSIBLE FLOW
An old integration scheme for compressible flows revisited, refurbished and put to work
[NASA-CR-15775] N78-33382
COMPRESSION LOADS
Strength and deformation analysis of concrete under multiaxial stresses
N78-33474
COMPRESSION TESTS
An evaluation of the sandwich beam in four-point bending as a compressive test method for composites
[NASA-TM-78783] N78-33153
COMPRESSIVE STRENGTH
Microstructurally developed toughening mechanisms in ceramics. Compressive surface stresses developed in ceramics by an oxidation-induced phase change
[AD-A057242] N78-33234
Effect of hydrostatic pressure on the deformation behavior of polyethylene and polycarbonate in tension and in compression
[AD-A056786] N78-33236
COMPRESSOR BLADES
A viscous-inviscid interactive compressor calculation
N78-33040
Blade row dynamic digital compression program. Volume 2: J85 circumferential distortion redistribution model, effect of Stator characteristics, and stage characteristics sensitivity study
[NASA-CR-134953] N78-33103
COMPRESSOR EFFICIENCY
Design and overall performance of four highly loaded, high speed inlet stages for an advanced high-pressure-ratio core compressor
[NASA-TP-1337] N78-33108
COMPRESSOR ROTORS
Performance of a transonic fan stage designed for a low meridional velocity ratio
[NASA-TP-1298] N78-33107
Design and overall performance of four highly loaded, high speed inlet stages for an advanced high-pressure-ratio core compressor
[NASA-TP-1337] N78-33108
Design and performance of a 427-meter-per-second-tip-speed two-stage fan having a 2.40 pressure ratio
[NASA-TP-1314] N78-33109
COMPUTATION
Lagrangian finite-difference calculations of an explosion in a partially water-filled rigid cylindrical tank
[SAND-77-1394] N78-33488
COMPUTER ASSISTED INSTRUCTION
Application of adaptive decision aiding systems to computer assisted instruction: Adaptive Computerized Training System [ACTS]
[AD-A056900] N78-33797
COMPUTER DESIGN
The transition-map-entered-variable [T-MEV] mapping technique for sequential machine design
N78-33749
Distributed data processing: Microcomputer elements and design aids
N78-33766
A computer hardware design language for multiprocessor systems
[AD-A056111] N78-33794
COMPUTER GRAPHICS
System Avionics Value Estimation [SAVE]: An aid for avionics logistics-and-support-cost analyses
[AD-A056348] N78-33097
Evolution of an FR-80 generated movie of opposed jet fluid flow
[K/CSD/INF-78/15] N78-33393
Geographic data display
[AD-A056101] N78-33514
Program documentation for the terrain and flight dynamics program --- computer graphics for flight simulation
[AD-A056116] N78-33742

A symbolic system for computer-aided development of surface interpolants
[AD-A056861] N78-33756
The PADL-1.0/n processor: Overview and system documentation
[PB-281550/4] N78-33758
Representations in the PADL-1.0/n processor: Simple geometric entities
[PB-281551/2] N78-33759
Representations in the PADL-1.0/n processor: Boundary representations and the BFILE/1 system
[PB-281552/0] N78-33760

COMPUTER INFORMATION SECURITY
Computer information security and protection, volume 1. Citations from the NTIS data base
[NTIS/PS-78/0859/5] N78-33763
Computer information security and protection, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0860/3] N78-33764
Computer information security and protection. Citations from the engineering index data base
[NTIS/PS-78/0861/1] N78-33765

COMPUTER NETWORKS
Computer science and technology: The design and implementation of the National Bureau of Standards' Network Access Machine [NAM]
[PB-282510/7] N78-33762
Optimal branching probabilities and their relationship to computer network file distribution
N78-33809
Hardware scheduling strategies for systems with many processors
N78-33810
Measures of congestion for computer communication networks
N78-33811
A lower bound to protocol information in data networks
[AD-A056345] N78-33812
NOS operating system base for Sandia's scientific computer network
[SAND-78-0132] N78-33815

COMPUTER PROGRAMMING
The PADL-1.0/n processor: Overview and system documentation
[PB-281550/4] N78-33758
Representations in the PADL-1.0/n processor: Simple geometric entities
[PB-281551/2] N78-33759
Representations in the PADL-1.0/n processor: Boundary representations and the BFILE/1 system
[PB-281552/0] N78-33760
Source and channel coding theory
N78-33767
SDMS: A scientific data management system
N78-33783
A parameter estimation subroutine package
[NASA-CR-157766] N78-33789
A special purpose linear programming algorithm for obtaining least absolute value estimators in a linear model with dummy variables
[AD-A056762] N78-33796
CAT: A computer code for the automated construction of fault trees
[EPRI-NP-705] N78-33801
Table producing language systems installation instructions, version 4.0
[PB-281376/4] N78-33802
Print control language, version 4.0: Users guide
[PB-281377/2] N78-33803
Table producing languages, version 4.0: Users guide. Including codebook language
[PB-281378/0] N78-33804
The development and uses of Table Producing Language
[PB-281379/8] N78-33805
Structured programming. A bibliography with abstracts
[NTIS/PS-78/0688/8] N78-33806

COMPUTER PROGRAMS
Derivation and evaluation of an approximate analysis for three-dimensional viscous subsonic flow with large secondary velocities --- finite difference method
[NASA-CR-159430] N78-33044
A study of alternatives for VSTOL computer systems
[AD-A056105] N78-33098
DYGABCD: A program for calculating linear A, B, C, and D matrices from a nonlinear dynamic engine simulation
[NASA-TP-1295] N78-33110
Telemetry test methods
[BDX-613-1811-REV] N78-33139
Theory, computer program, and illustrative examples for the two-dimensional boundary layer flow of ideal gases
[AD-A056308] N78-33390
NACHOS: A finite element computer program for incompressible flow problems. Part 1: Theoretical background
[SAND-77-1333-PT-1] N78-33395
Computer automation on an electron-beam welder with automatic, stored seam tracking
[Y-2114] N78-33452
Creation of lumped parameter thermal model by the use of finite elements
[NASA-CR-158944] N78-33479
Computer-aided environmental impact analysis for industrial, procurement, and research Development, test, and evaluation activities: User's manual
[AD-A056997] N78-33620
TRAV10 horizontal network adjustment program
[PB-283087/5] N78-33668
Dissemination of the PADL-1.0/n processor: Part and Assembly Description Language [PADL]
[PB-281549/6] N78-33757
Study of a class of parallel programs
N78-33772
Guide to a condensed form of NASTRAN
[NASA-RP-1019] N78-33791
SALOGS digital logic simulator
[SAND-78-0390C] N78-33816
Performance analysis of the Technology Chess Program
[AD-A056072] N78-33868
The design and implementation of Instructional Software Information System [ISIS]
[AD-A056323] N78-33984

COMPUTER STORAGE DEVICES
Simulation studies of the database computer [DBC]
[AD-A056048] N78-33753

COMPUTER SYSTEMS DESIGN
A design-interpretation analysis of natural English with applications to man-computer interaction
[AD-A056121] N78-33752
Analysis of parallel system design using context-free grammars
N78-33771
A comparison of hardware description languages --- describing digital systems structure and behavior to a computer
[NASA-CR-157762] N78-33788
Reference bibliography on operating system design issues for distributed systems [first release]
[AD-A056560] N78-33813

COMPUTER SYSTEMS PROGRAMS
A cost benefit analysis of proposed Federal input/output channel level computer interface standards
[PB-282406/8] N78-33761
The ARGOS image understanding system
N78-33770
An interactive system for the generation of standardized autopsy protocols
N78-33773
A data management system for weight control and design-to-cost
N78-33780
Interactive electronic circuit simulation on small computer systems with a real time algorithm for ac analysis
N78-33808

COMPUTER TECHNIQUES
An operational message composition system using the NWS Automatic Data Acquisition System [ADAS] computer system
[PB-283088/3] N78-33691
Quantitative organ visualization
N78-33708
Engineering and Scientific Data Management
[NASA-CP-2055] N78-33776
CAD/CAM data management needs, requirements and options
N78-33778
Portability techniques for BLISS programs
[AD-A056066] N78-33795
Techniques for digital data transformation and monitoring
[SAND-77-1604C] N78-33800

COMPUTERIZED DESIGN
Computer-aided design and manufacturing for extrusion of aluminum, titanium and steel structural parts. Phase 2: Application to practical extrusions. Volume 1: Description of CAD/CAM systems for extrusion of structural shapes
[AD-A056965] N78-33200
Computer-aided design and manufacturing for extrusion of aluminum, titanium and steel structural parts. Phase 2: Application to practical extrusions. Volume 2: User's manual for ALEXTR system of computer programs for design and manufacture of flat-face dies for aluminum extrusion
[AD-A056966] N78-33201
Computer-aided engineering of semiconductor integrated circuits
[AD-A056914] N78-33345
Computer aided design of microcircuits. Citations from the engineering data base
[NTIS/PS-78/0822/3] N78-33361
Interactive composite joint design. Part 2: User's manual
[AD-A056712] N78-33449
Optimization algorithms for computer aided design problems
N78-33769
Advanced program weight control system
N78-33779
Associative programming language and virtual associative access manager
N78-33781
RIM: A prototype for a relational information management system
N78-33785
Engineering data management: Experience and projections
N78-33787
A comparison of hardware description languages --- describing digital systems structure and behavior to a computer
[NASA-CR-157762] N78-33788

COMPUTERIZED SIMULATION
Mechanization of blended A sub N mode for CCV YF-16
[AD-A056553] N78-33089
DYGABCD: A program for calculating linear A, B, C, and D matrices from a nonlinear dynamic engine simulation
[NASA-TP-1295] N78-33110
Parameter estimation for generator simulation studies
[AD-A057006] N78-33351
Computer simulation of plastic deformation in the Charpy V-notch impact test
[UCRL-80868] N78-33491
Preliminary optimization model for assessment of energy development in the Rocky Mountain region
[LA-6689-MS] N78-33558
Thermal drawdown and recovery of singly and multiply fractured hot dry rock reservoirs
[LA-7219-MS] N78-33572
Atmospheric and Geophysical Sciences Division, Physics Department program report, FY 1977
[UCRL-51444-77] N78-33624
Computer simulation of the visual effects of smoke plumes
[LA-UR-78-689] N78-33625
Tailored climatology of severe weather --- computerized simulation
[AD-A056988] N78-33679
Development of techniques for short-range precipitation forecasts
[AD-A057153] N78-33680
Adaptation of time line analysis program to single pilot instrument flight research
[NASA-TM-78748] N78-33731
Simulation studies of the database computer [DBC]
[AD-A056048] N78-33753
A comparison of hardware description languages --- describing digital systems structure and behavior to a computer
[NASA-CR-157762] N78-33788

COMPUTERS
Multiple-coupled random access techniques for packet radio networks
[AD-A056550] N78-33298
Systems analysis of scientific and technical communication in the United States. Annex 1: Communication functions in science and technology
[PB-281848/2] N78-33987
Systems analysis of scientific and technical communication in the United States. Annex 4: The cost model
[PB-281851/6] N78-33990

CONCENTRATION [COMPOSITION]
Ozone concentration in the cabin of a Gates Learjet measured simultaneously with atmospheric ozone concentrations
[NASA-TP-1340] N78-33618
The effect of dissolved oxygen concentration activated sludge process performance
N78-34002

CONCENTRATORS
High-temperature linear radiation-cavity solar collector with a Fresnel concentrator
N78-33524
Solar energy concentrator design and operation. Citations from the engineeringindex data base
[NTIS/PS-78/0839/7] N78-33609

CONCORDE AIRCRAFT
Comparison of low-frequency noise levels of the Concorde supersonic transport with other commercial service airplanes
[NASA-TM-78736] N78-33873

CONCRETES
Buckling of reinforced concrete spherical shells
N78-33472
Strength and deformation analysis of concrete under multiaxial stresses
N78-33474

CONFERENCES
Symposium proceedings: Environmental aspects of fuel conversion technology, 3
[PB-282429/0] N78-33636
Engineering and Scientific Data Management
[NASA-CP-2055] N78-33776
Information transfer and use in chemistry
[BLL-BLRDR-5385] N78-34001

CONSTITUTIVE EQUATIONS
Creep-recovery constitutive equation and its time-independent limit
[CONF-780540-1] N78-33496

CONSTRAINTS
Radar processing with baseband hard limiting
N78-33281

CONSTRUCTION
Construction quality control systems: A comparative analysis
[AD-A056334] N78-33467
Minimum Energy Dwelling [MED] workbook: An investigation of techniques and materials for energy conscious design
[SAN-1198-1] N78-33553
CONTAMINANTS
Effects of deburring contaminants on electroplating adhesion
[BDX-613-1757-REV] N78-33397
CONTEXT FREE LANGUAGES
Analysis of parallel system design using context-free grammars
N78-33771
CONTINENTAL SHELVES
Lower Cook Inlet: Another example of more data needed for appraising outer continental shelf oil and gas resources --- resources management
[PB-281769/0] N78-33521
CONTINUUM FLOW
Coal fired prototype high temperature continuous flow heat exchanger. AF-684 research project 545-1
[EPRI-AF-684] N78-33391
CONTROL
A digital control unit for a rocket borne quadrupole mass spectrometer
[AD-A057251] N78-33141
CONTROL CONFIGURED VEHICLES
Mechanization of blended A sub N mode for CCV YF-16
[AD-A056553] N78-33089
CONTROL EQUIPMENT
Closed loop control systems. Part 2: Miscellaneous applications. A bibliography with abstracts
[NTIS/PS-78/0810/8] N78-33278
Two-channel high-speed drive for an optical sighting device, operating under conditions of a random moment of load on the output shaft
N78-34030
CONTROL SIMULATION
Shake testing of vehicles through recorded simulation control scheme, volume 1
[AD-A056543] N78-33792
Recorded simulation control scheme: User's manual, volume 2, supplement
[AD-A056544] N78-33793
CONTROL STABILITY
Independent stability and control analysis of navigation development satellites for the global positioning system. Volume 1: Technical report
[AD-A056811] N78-33081
Independent stability and control analysis of navigation development satellites for the global positioning system. Volume 2: Appendixes
[AD-A056812] N78-33082
Theoretical study of multicyclic control of a controllable twist rotor
[NASA-CR-151959] N78-33085
CONTROL THEORY
A learning control system with application to flight systems
N78-33112
Mechanical system identification and decomposition by dynamic data system methodology
N78-33443
CONVECTION
Thermal drawdown and recovery of singly and multiply fractured hot dry rock reservoirs
[LA-7219-MS] N78-33572
CONVECTIVE FLOW
Convection induced by G-jitter in rectangular enclosures aboard spacecraft
N78-33084
CONVERGENCE
General convergence theorems: Their relationships and applications
N78-33830
Information theoretic methods for indicating the speed of convergence and approximation accuracy of distributions
N78-33845
CONVEXITY
Source radiation in the presence of smooth convex bodies
[AD-A056645] N78-33296
COPOLYMERS
Polycarboranes. A bibliography with abstracts
[NTIS/PS-78/0865/2] N78-33246
COPPER
The growth and crystallographic characteristics of sulfide films on [111] copper investigated by RHEED
N78-33952
COPPER ALLOYS
High temperature cyclic deformation in nickel TD-nickel, and Al-4 percent Cu alloy aged to contain theta prime and theta double prime
N78-33190
Impression creep of LiF and Cu-Ni single crystals
N78-33956
COPPER COMPOUNDS
Hydridocyclophosphazenes: Synthesis via organocopper reagents
[AD-A056094] N78-33168
COPPER SULFIDES
The growth and crystallographic characteristics of sulfide films on [111] copper investigated by RHEED
N78-33952
CORRELATORS
The storage correlator: Theory and signal processing applications
N78-33327
CORROSION
Low cycle corrosion fatigue and corrosion fatigue crack propagation of high strength 7000-type aluminum alloys
N78-33191
Feasibility of ultrasonic Rayleigh waves for the detection of corrosion beneath paint
[AD-A056643] N78-33199
Hot corrosion/erosion testing of materials for applications for advanced power conversion systems using coal-derived fuels. Task 2. Evaluation of turbine materials for use in a coal-fired fluidized bed combustion environment
[FE-2326-20] N78-33210
Catalog information on the performance of aluminum in sea water --- ocean thermal energy conversion
[PNL-2606] N78-33211
Lithium batteries, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0660/7] N78-33603
Lithium batteries. Citations from the engineering index data base
[NTIS/PS-78/0661/5] N78-33604
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0665/6] N78-33882
CORROSION RESISTANCE
Ceramics technology readiness development program. Phase 1: Conceptual designs and material screening --- erosion/corrosion resistance
[FE-2786-12] N78-33243
COSMIC RAYS
Experiment definition and integration study for the accommodation of giant, passive detector of Exotic Particles In the Cosmic Rays [EPIC] payload on shuttle/spacelab missions
[NASA-CR-156842] N78-34025
Observability of the neutrino flux from the inner region of the galactic disk
[NASA-TM-79658] N78-34026
The dynamical halo and the variation of cosmic-ray path length with energy
[NASA-TM-79647] N78-34027
COSMIC X RAYS
X ray spectra of X Per --- oso-8 observations
[NASA-TM-79646] N78-34013
COST ANALYSIS
System Avionics Value Estimation [SAVE]: An aid for avionics logistics-and-support-cost analyses
[AD-A056348] N78-33097
Energy efficiency and electric motors
[HCP/M50217-01] N78-33591
A cost benefit analysis of proposed Federal input/output channel level computer interface standards
[PB-282406/8] N78-33761
COST EFFECTIVENESS
Prospects for a civil/military transport aircraft
[NASA-TM-78724] N78-33060
Cost effective GaAs Read IMPATT transmitters
[AD-A056996] N78-33352
COUPLING COEFFICIENTS
Mutual coupling analysis in a finite planar rectangular waveguide antenna
[AD-A056858] N78-33315
COUPLINGS
A study of the effect of the rotor coil couplings of a synchronous machine on its predicted transient response
N78-33330
CRACK PROPAGATION
Low cycle corrosion fatigue and corrosion fatigue crack propagation of high strength 7000-type aluminum alloys
N78-33191
Flaw growth in complex structure. Volume 1: Technical discussion
[AD-A056372] N78-33483
Development of a crack growth rate test for quality control
[AD-A056373] N78-33484
Crack tip plasticity associated with corrosion-assisted fatigue --- carbon steels
[AD-A056860] N78-33487
CRACKING [FRACTURING]
Mathematical analysis of stress cracks, volume 1. A bibliography with abstracts
[NTIS/PS-78/0768/8] N78-33498
CREEP ANALYSIS
Creep-recovery constitutive equation and its time-independent limit
[CONF-780540-1] N78-33496
CREEP PROPERTIES
Physically-based internal variable model for rate-dependent plasticity
[SAND-78-0181C] N78-33495
CREEP RUPTURE STRENGTH
Stress-rupture life of Kevlar/epoxy spherical pressure vessels
[UCID-17755-PT-1] N78-33492
CREEP TESTS
Impression creep of LiF and Cu-Ni single crystals
N78-33956
CROP INVENTORIES
An analytic study of a minimum chi-2-estimation procedure
N78-33848
CROSS RELAXATION
Nuclear magnetic resonance relaxation in aqueous protein systems --- cross relaxation and relaxation time
N78-33155
CROSS SECTIONS
Photodissociation cross sections for Ar sub 2+, Kr sub 2+, and Xe sub 2+ at 3.0 and 3.5 eV
[AD-A057195] N78-33170
CROSSTALK
The phase of the crosspolarized signal generated by millimeter wave propagation through rain
[NASA-CR-156841] N78-33288
CRYOGENICS
Development of nickel-free austenitic stainless steels for ambient and cryogenic applications
[LBL-7397] N78-33223
Materials studies for magnetic fusion energy applications at low temperatures, 1
[PB-282444/9] N78-33225
Publication and services of the Cryogenics Division, National Bureau of Standards, 1953 - 1977
[PB-281465/5] N78-33276
Cryobiology. A bibliography with abstracts
[NTIS/PS-78/0678/9] N78-33707
CRYSTAL DISLOCATIONS
Phonon scattering by dislocations
N78-33949
CRYSTAL GROWTH
Study of ice growth in slightly undercooled water
N78-33871
CRYSTAL LATTICES
Radio frequency size effect measurements on the Fermi surface of rhenium
N78-33962
CRYSTAL OSCILLATORS
Surface acoustic wave stabilized oscillators: Additional aging results
[NASA-CR-156833] N78-33340
CRYSTAL STRUCTURE
Liquid crystals. A bibliography with abstracts
[NTIS/PS-78/0767/0] N78-33974
CRYSTAL SURFACES
Electron-spin polarization in low energy electron diffraction from tungsten [001]
N78-33960
CRYSTALLIZATION
Effect of silicon carbide on devitrification of a glass coating for reusable surface insulation
[NASA-TM-78755] N78-33230
CUES
Emulation of an advanced G-seat on the advanced simulator for pilot training
[AD-A055532] N78-33741
CURVES [GEOMETRY]
The approximation of plane curves by means of circular-arc-based elements
N78-33829
CUSHIONS
Container cushioning design engineer users manual: CDC-6600 FORTRAN version, volume 2
[AD-A057245] N78-33451
CYCLONES
An analysis of the kinetic energy of two extratropical cyclones
N78-33673
CYCLOTRON RESONANCE
Far infrared cyclotron resonance in semiconducting lead telluride
N78-33950
CYLINDRICAL ANTENNAS
Charge condition at the junction of unequal radii wires. Part 2: Current distribution on thick cylindrical structures
[AD-A056894] N78-33307
CYLINDRICAL BODIES
Analysis of a high speed ring valve system for a single cylinder reciprocating compressor
N78-33442
Youngdahl stress functions and quasi-static nonaxisymmetric thermal stresses in a finite cylinder
[AD-A057196] N78-33485
CYLINDRICAL SHELLS
Dynamic response of a cylindrical shell immersed in a potential fluid
[UCRL-52464] N78-33493
CYLINDRICAL TANKS
Lagrangian finite-difference calculations of an explosion in a partially water-filled rigid cylindrical tank
[SAND-77-1394] N78-33488

D

DAMPING
On the radiation damping of high externally resonant electromagnetic systems
[AD-A056316] N78-33317
DATA ACQUISITION
TRSB microwave landing system demonstration program at Shiraz, Iran
[AD-A055526] N78-33071
Bell UH-1H RAM/LOG report
[AD-A057231] N78-33091
Solid State Data Acquisition and Processing System [SSDAPS]. Volume 3: Description, installation, calibration, and operating procedures --- for vehicle dynamics studies
[PB-282402/7] N78-33125
Underground data acquisition and telemetry system
[AD-A056317] N78-33138
Data acquisition systems applied to printed-wiring-board measurements
[SAND-78-8501] N78-33358
A theoretical investigation of signal acquisition and digital communication in a coupling-modulated carbon dioxide laser system
N78-33422
DATA BASES
Simulation studies of the database computer [DBC]
[AD-A056048] N78-33753
Computer information security and protection, volume 1. Citations from the NTIS data base
[NTIS/PS-78/0859/5] N78-33763
Computer information security and protection, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0860/3] N78-33764
Computer information security and protection. Citations from the engineering index data base
[NTIS/PS-78/0861/1] N78-33765
Engineering and Scientific Data Management
[NASA-CP-2055] N78-33776
Design representation and consistency maintenance needs
N78-33777
CAD/CAM data management needs, requirements and options
N78-33778
A data management system for weight control and design-to-cost
N78-33780
Associative programming language and virtual associative access manager
N78-33781
Management of atmospheric data
N78-33782
SDMS: A scientific data management system
N78-33783
A data management system for engineering and scientific computing
N78-33786
Engineering data management: Experience and projections
N78-33787
The design and implementation of Instructional Software Information System [ISIS]
[AD-A056323] N78-33984
The conceptual framework for a comprehensive and continuing STI resource inventory
[PB-282345/8] N78-33999
DATA COMPRESSION
Digitized radar data compressor --- for air traffic control
[AD-A057442] N78-33290
Spectral distortion measures for speech compression
[AD-A056853] N78-33316
DATA LINKS
Multiple-coupled random access techniques for packet radio networks
[AD-A056550] N78-33298
Data Network Referee [DNR] concept report
[AD-A056960] N78-33814
DATA MANAGEMENT
Engineering and Scientific Data Management
[NASA-CP-2055] N78-33776
Design representation and consistency maintenance needs
N78-33777
CAD/CAM data management needs, requirements and options
N78-33778
A data management system for weight control and design-to-cost
N78-33780
Associative programming language and virtual associative access manager
N78-33781
Management of atmospheric data
N78-33782
SDMS: A scientific data management system
N78-33783
X10: A FORTRAN direct access data management system
N78-33784
RIM: A prototype for a relational information management system
N78-33785
A data management system for engineering and scientific computing
N78-33786
Engineering data management: Experience and projections
N78-33787
National highway inventory and performance summary-from the 1976 national highway inventory and performance study
[PB-281101/6] N78-34009
DATA PROCESSING
The analysis of National Transportation Safety Board small multiengine fixed-wing aircraft accident/incident reports for the potential presence of low-level wind shear
[AD-A056780] N78-33063
Ionospheric refraction corrections in the GTDS for satellite-to-satellite tracking data
[NASA-CR-156834] N78-33654
Investigation of micropulsation activity. 1: MAGAF system additions. 2: Data analysis
[AD-A056716] N78-33661
Development of techniques for short-range precipitation forecasts
[AD-A057153] N78-33680
Specification of cloud cover using multispectral satellite radiometric data
[PB-281160/2] N78-33686
Distributed data processing: Microcomputer elements and design aids
N78-33766
The approximation of plane curves by means of circular-arc-based elements
N78-33829
Clustering and classification of discrete data
N78-33846
Systems analysis of scientific and technical communication in the United States. Annex 3: An electronic alternative
[PB-281850/8] N78-33989
Department of energy's consolidation of information processing activities needs more attention
[PB-281269/1] N78-33996
DATA RECORDERS
Techniques for digital data transformation and monitoring
[SAND-77-1604C] N78-33800
DATA REDUCTION
Digroup data reduction system
[AD-A056986] N78-33304
Application of an array processor in satellite image processing
[AD-A056664] N78-33755
Progressive censoring on four-parameter Weibull distribution
N78-33852
DATA SAMPLING
Progressive censoring on four-parameter Weibull distribution
N78-33852
Optimal control system design: The predictive sampling problem
N78-33859
DATA STORAGE
Underground data acquisition and telemetry system
[AD-A056317] N78-33138
DATA SYSTEMS
An airborne meteorological data collection system using satellite relay [ASDAR]
[NASA-TM-78992] N78-33283
Spectral analysis methods for noisy sampled-data systems
N78-33331
An operational message composition system using the NWS Automatic Data Acquisition System [ADAS] computer system
[PB-283088/3] N78-33691
Initial considerations for a nationwide data base
[ISSN-0160-9742] N78-33983
DATA TRANSMISSION
A lower bound to protocol information in data networks
[AD-A056345] N78-33812
DEBRIS
Are the stratospheric dust particles meteor ablation debris or interplanetary dust?
[NASA-TM-78507] N78-34014
DECAY
Luminescent decay and spectra of impurity-activated alkali halides under high pressure
[COO-1198-1191] N78-33173
DECISION MAKING
Terminal radar interference criteria study --- air traffic controller performance
[AD-A057280] N78-33291
Institutional applications of solar total energy systems
[ALO-3786-2] N78-33569
Application of adaptive decision aiding systems to computer assisted instruction: Adaptive Computerized Training System [ACTS]
[AD-A056900] N78-33797
Planning telecommunications systems: A normative approach
N78-33866
Performance analysis of the Technology Chess Program
[AD-A056072] N78-33868
Comparative issues and methods in organizational diagnosis. Report 2: The decision tree approach
[AD-A057160] N78-33978
DECISION THEORY
The Bayesian multiple comparisons problems for uniform distrubutions and for translated exponential distributions
N78-33851
A decision theory approach to interval estimation
N78-33856
The zonal matching problem
N78-33867
DECODING
Analog algebraic decoding of linear block codes
N78-33768
DEFROSTING
Aircraft defogging and defrosting [transparent area]
[AD-A056976] N78-33094
DEGREES OF FREEDOM
Aerodynamic derivatives for an oblique wing aircraft estimated from flight data by using a maximum likelihood technique
[NASA-TP-1336] N78-33054
DEHYDRATION
Research on the application of solar energy to industrial drying or dehydration processes
[ORO-5123-1] N78-33583
DEHYDROGENATION
Solar-thermochemical production of hydrogen from water
[LA-UR-78-1052] N78-33586
DELAY
Airline delay trends, 1972-1977
[AD-A056867] N78-33062
DELAY LINES
Radar processing with baseband hard limiting
N78-33281
DELPHI METHOD [FORECASTING]
The statistical manipulation of delphi statements
N78-34003
DELTA WINGS
Estimation of leading-edge thrust for supersonic wings of arbitrary planform
[NASA-TP-1270] N78-33051
DEMAND [ECONOMICS]
Characteristics of future air cargo demand and impact on aircraft development: A report on the Cargo/Logistic Airlift Systems Study [CLASS] project
[NASA-TM-78774] N78-33061
Commercial demand for energy: A disaggregated approach
[ORNL/CON-15] N78-33570
DENSITOMETERS
Instrumentation development of Raster scanning densitometer
[AD-A056968] N78-33309
Detection and location of reseaux using pictorial pattern recognition
N78-33502
DEPENDENT VARIABLES
Dynamic ADI methods for elliptic equations with gradient dependent coefficients
N78-33826
DEPLOYMENT
Station keeping of the space shuttle in the vicinity of a deployed payload
[AD-A056109] N78-33136
DEPOLARIZATION
The phase of the cross polarized signal generated by millimeter wave propagation through rain
[NASA-CR-156841] N78-33288
DEPOSITION
The estimation of air concentrations due to the diffusion, deposition and resuspension of contaminants by the wind
N78-33674
DEPTH MEASUREMENT
A method of detecting and characterizing subsurface layers by means of electromagnetic depth sounding
N78-33279
DESCRIPTIVE GEOMETRY
Geometry requirements for unsteady aerodynamics in aeroelastic analysis and design
[NASA-TM-78781] N78-33046
DESIGN ANALYSIS
Wing planform geometry effects on large subsonic military transport airplanes
[AD-A056124] N78-33088
Primary Adhesively Bonded Structure Technology [PABST]. Phase 1: Detail design
[AD-A056857] N78-33095
Lead batteries. Citations from the NTIS data base
[NTIS/PS-78/0689/6] N78-33605
DESORPTION
Desorption and surface diffusion: Nitrogen on tungsten [110]
[AD-A056346] N78-33165

DESULFURIZING
Coal desulfurization
[NASA-CASE-NPO-14272-1] N78-33164
DETECTION
Feasibility of ultrasonic Rayleigh waves for the detection of corrosion beneath paint
[AD-A056643] N78-33199
DF LASERS
Spectrophone analysis of gas samples obtained at field site
[AD-A057202] N78-33621
DIAMONDS
Lightweight laser mirror structural studies
[Y-DA-7472] N78-33437
DICTIONARIES
National Computer Center personnel management information system design requirements specification. Volume 1: Design requirements and data dictionary
[PB-282589/1] N78-33981
DIELECTRIC PROPERTIES
A model dielectric function for silicon
N78-33959
Dielectric and optical properties of thin films --- birefrigent coatings
[AD-A056822] N78-33971
DIELECTRICS
Effects of excess charge density on dielectric breakdown
N78-33325
DIES
Machine casting of ferrous alloys
[AD-A056824] N78-33204
DIESEL ENGINES
Ultrasonic lubrication
[AD-A056050] N78-33448
Performance characteristics of automotive engines in the United States. First series, report no. 12: 1975 Perkins diesel 247 CID (4.0 liters), FI --- to determine fuel consumption and emissions
[PB-281777/3] N78-33458
DIESEL FUELS
Performance of gasoline and diesel fuels produced from COED syncrude
[BERC/RI-78/2] N78-33261
Effects of catalytic reactors on diesel exhaust composition
[PB-281083/6] N78-33628
DIFFERENTIAL EQUATIONS
Large deviations for diffusions depending on small parameters: A stochastic control method
[AD-A055652] N78-33860
DIFFRACTION PATTERNS
Determination of particle size using measurement of scatter
[NASA-CR-157741] N78-33914
DIFFRACTOMETERS
Geometrical problems with a position sensitive detector employed on a diffractometer, including its use in the measurement of stress
[AD-A056662] N78-33486
DIFFUSION COEFFICIENT
Large deviations for diffusions depending on small parameters: A stochastic control method
[AD-A055652] N78-33860
The dynamical halo and the variation of cosmic-ray path length with energy
[NASA-TM-79647] N78-34027
DIFFUSIVITY
Moisture diffusion in fiber reinforced composites --- graphite-epoxy composites
[AD-A056557] N78-33154
DIGITAL COMMAND SYSTEMS
Engineering and development program plan: Advanced Integrated Flight Systems [AIFS]
[AD-A056770] N78-33119
DIGITAL COMPUTERS
SALOGS digital logic simulator
[SAND-78-0390C] N78-33816
DIGITAL DATA
Mapping ultramafic rocks by computer analysis of digital LANDSAT data
N78-33504
Techniques for digital data transformation and monitoring
[SAND-77-1604C] N78-33800
High-speed lookup table technique for digital multiplication
[SAND-77-1866] N78-33840
DIGITAL FILTERS
The performance of digital matched filters for multilevel signals
N78-33280
The effect of multipath interference on the performance of a digital matched filter
N78-33329
Forecasting and whitening filter estimation
[AD-A056540] N78-33836
DIGITAL RADAR SYSTEMS
Digitized radar data compressor --- for air traffic control
[AD-A057442] N78-33290
DIGITAL SYSTEMS
A study of alternatives for VSTOL computer systems
[AD-A056105] N78-33098
Hardware design of a digital single-sideband generator
[AD-A057033] N78-33303
Automation of module set independent register-transfer level design
N78-33332
A comparison of hardware description languages --- describing digital systems structure and behavior to a computer
[NASA-CR-157762] N78-33788
DIGITAL TECHNIQUES
Sequential least squares estimation of slowly time-varying parameters --- applicable to digital signal processing
N78-33834
DILUTION
Magnetic properties of two dilute spin systems --- amorphous metals
N78-33957
DIMERS
Photodissociation cross sections for Ar sub 2+, Kr sub 2+, and Xe sub 2+ at 3.0 and 3.5 eV
[AD-A057195] N78-33170
DIODES
The present situation and forecasts of semiconductor elements performance within the microwave range, 1970-1985
[NASA-TM-75453] N78-33338
Transistor step stress testing program, JANTX 2N2905A
[NASA-CR-150821] N78-33341
Extended development of variable conductance heat pipes
[NASA-CR-152183] N78-33379
Active devices for high temperature microcircuitry
[SAND-77-1145] N78-33414
Time dependent electron and ion flow in pinched beam diodes
[AD-A056362] N78-33908
DISCRIMINATION
System definition and investigation of the on site processing of en route sensor signals. Addendum: Investigation into possible en route on site beacon ring around discriminants
[AD-A056941] N78-33070
DISPERSING
A distribution model for the aerial application of granular agricultural particles
[NASA-CR-157745] N78-33048
DISPLAY DEVICES
Human factors engineering for head-up displays: A review of military specifications and recommendations for research
[AD-A056944] N78-33099
Development of a symbology exerciser for display generation and analysis on the visually-coupled airborne systems simulator [VCASS]
[AD-A055464] N78-33124
Geographic data display
[AD-A056101] N78-33514
Program documentation for the terrain and flight dynamics program --- computer graphics for flight simulation
[AD-A056116] N78-33742
DISSOCIATION
High efficiency collision-induced dissociation in an RF-only quadrupole
[AD-A057201] N78-33171
DISTORTION
Spectral distortion measures for speech compression
[AD-A056853] N78-33316
DISTRIBUTED PARAMETER SYSTEMS
Reference bibliography on operating system design issues for distributed systems [first release]
[AD-A056560] N78-33813
DISTRIBUTION [PROPERTY]
A network augmenting path basic algorithm for transshipment problems
[AD-A056761] N78-33869
DISTRIBUTION FUNCTIONS
A distribution model for the aerial application of granular agricultural particles
[NASA-CR-157745] N78-33048
A study of two-armed bandits
N78-33857
DISTRICT OF COLUMBIA
Survey of the occurrence of mercury, lead, and cadmium in the Washington, D. C. area
[PB-281725/2] N78-33629
DOMESTIC ENERGY
Phoenix House: Solar-assisted heat pump system evaluation
[EPRI-ER-712] N78-33574
Environmental development plan for buildings and community systems, 1977
[DOE/EDP-0020] N78-33622
DOPPLER RADAR
Applications of polarization-diversity radar and lidar in meteorology
[AD-A056571] N78-33678
National Severe Storms Laboratory: History and FY 1976 program
[PB-282665/9] N78-33688
DRAG REDUCTION
Drag reducing fluids. A bibliography with abstracts
[NTIS/PS-78/0730/8] N78-33402
An investigation of drag reduction for tractor trailer vehicles
[NASA-CR-144877] N78-33444
DROPS [LIQUIDS]
A photographic techaique to obtain droplet and flow pattern data in two-phase flow for use in modeling
N78-33371
DRY HEAT
Thermal drawdown and recovery of singly and multiply fractured hot dry rock reservoirs
[LA-7219-MS] N78-33572
DRYING
Research on the application of solar energy to industrial drying or dehydration processes
[ORO-5123-1] N78-33583
DUAL THRUST NOZZLES
Dual throat thruster cold flow analysis
[NASA-CR-150822] N78-33142
DUCTILITY
EPRI ductile fracture research review document --- nuclear pressure vessels
[EPRI-NP-701-SR] N78-33489
DUMMIES
Fast neutron depth dose distributions in a heterogeneous phantom
N78-33712
Evaluation of seating and restraint systems and anthropomorphic dummies conducted during fiscal year 1977
[AD-A056905] N78-33737
DUST
Dust adhesion on Viking lander camera window
[NASA-TM-78782] N78-33407
DYE LASERS
Measurement of absorption coefficients of water in the visible spectral region, phase 1 and 2
[PB-281500/9] N78-33182
Electron beam pumped vapor phase dye lasers
N78-33423
Dye laser, volume 2. A bibliography with abstracts
[NTIS/PS-78/0872/8] N78-33439
DYNAMIC CHARACTERISTICS
Solid State Data Acquisition and Processing System [SSDAPS]. Volume 3: Description, installation, calibration, and operating procedures --- for vehicle dynamics studies
[PB-282402/7] N78-33125
Dynamic characterization of poroelastic materials
N78-33147
Thermal and molecular effects on solid state behavior of rigid poly[vinylchloride]
N78-33227
DYNAMIC LOADS
Automated resizing optimization of generally loaded planar frames via linear programming techniques
[AD-A056567] N78-33482
DYNAMIC MODELS
Blade row dynamic digital compression program. Volume 2: J85 circumferential distortion redistribution model, effect of Stator characteristics, and stage characteristics sensitivity study
[NASA-CR-134953] N78-33103
Mechanical system identification and decomposition by dynamic data system methodology
N78-33443
Room-temperature inelastic test of a nozzle-to-spherical-shell model subjected to pressure and moment loading
[ORNL/TM-6170] N78-33490
Lattice dynamics of alpha uranium
N78-33967
DYNAMIC RESPONSE
ATS-6 flight accelerometers --- in-flight monitoring of spacecraft dynamic response
[NASA-TM-79847] N78-33096
Measuring and predicting the dynamic effects of a confined thin metal plate pulse heated into the liquid-vapor regime
N78-33192
Dynamic response of a cyclindrical shell immersed in a potential fluid
[UCRL-52464] N78-33493
DYNAMIC STABILITY
Subsonic dynamic stability characteristics of two close-coupled canard-wing configurations
[NASA-TP-1291] N78-33050

E

EARTH ATMOSPHERE
Optical characteristics of the earth's surface and atmosphere from the point of view of the remote sensing of natural resources: Review of the contemporary status of the problem
[NASA-TM-75548] N78-33642
On the nature and distribution of solar radiation --- insolation and earth atmosphere effects
[HCP/T2552-01] N78-33667

EARTH CRUST
Determining crustal strain rates with a spaceborne geodynamics ranging system. 2: Station coordinate analysis
[NASA-TM-79627] N78-33647
EARTH MOVEMENTS
Pulsations and expansion of the earth: A oossible key to an understanding of its tectonic development and volcanism in the phanerozoic
N78-34033
EARTH ORBITS
In-orbit storage of NOAA-NESS standby satellites
[PB-283078/4] N78-33133
Development, test, and calibration of a three-axis accelerometer system
[AD-A056711] N78-33408
Application of inversion theory to new satellite systems for determination of the gravity field
[AD-A057188] N78-33666
EARTH PLANETARY STRUCTURE
Tectonic asymmetry of the earth and other planets
[NASA-TM-75576] N78-33643
EARTH RESOURCES
Optical characteristics of the earth's surface and atmosphere from the point of view of the remote sensing of natural resources: Review of the contemporary status of the problem
[NASA-TM-75548] N78-33642
EARTH SURFACE
A method of detecting and characterizing subsurface layers by means of electromagnetic depth sounding
N78-33279
Optical characteristics of the earth's surface and atmosphere from the point of view of the remote sensing of natural resources: Review of the contemporary status of the problem
[NASA-TM-75548] N78-33642
EARTHQUAKES
Statistical models for seismic magnitude
[AD-A056140] N78-33658
ECCENTRICITY
The interaction between the utricles and the semicircular canals during eccentric rotation
N78-33714
ECONOMETRICS
The Gini index, the Lorenz curve, and the total time on test transforms
[AD-A056095] N78-33466
ECONOMIC ANALYSIS
Contingency plans for chromium utilization. Publication NMAB-335
[NASA-CR-157789] N78-33207
Engineering in the 21st century
[NASA-TM-79010] N78-33380
Economic feasibility of strontium-90 fueled heaters for use in cold regions
[PNL-2476] N78-33546
Appraisal of energy analysis
[EPRI-EA-504] N78-33547
Residential space heating cost: Geothermal vs conventional systems
[TREE-1182] N78-33567
Phoenix House: Solar-assisted heat pump system evaluation
[EPRI-ER-712] N78-33574
Development of high-efficiency cost-effective, zinc-chlorine batteries for utility peak-shaving, 1976
[EPRI-EM-711] N78-33590
Assessment of the role of advanced technologies in small utilities
[EPRI-EM-696-VOL-2] N78-34008
ECONOMIC FACTORS
Simple economic model for energy research and supply strategies, draft
[DOE/ER-0005/D] N78-33557
Passenger car fuel economy in short trip operation
[COO-4248-1] N78-33592
Biomass energy success stories: A portfolio illustrating current economic uses of renewable biomass energy
[HCP/T0285-02] N78-33598
ECOSYSTEMS
Ecosystem mapping by interpretation of landscapes from satellite imagery
N78-33503
EDUCATION
Organizing to use a new telecommunications technology: Communications satellites and vocational rehabilitation
[PB-282283/1] N78-33323
Application of adaptive decision aiding systems to computer assisted instruction: Adaptive Computerized Training System [ACTS]
[AD-A056900] N78-33797
EFFECTIVE PERCEIVED NOISE LEVELS
Annoyance due to the interaction of community noise sources
N78-33613
The effort of noise exposure on the masking level difference
N78-33709
EFFLUENTS
Significance of process variables on liquid effluent production in coal gasification
N78-33525
ELASTIC BUCKLING
Buckling of reinforced concrete spherical shells
N78-33472
ELASTIC DEFORMATION
Metal deformation modeling: Stress relaxation of aluminum
[SAND-78-0164C] N78-33209
Strength and deformation analysis of concrete under multiaxial stresses
N78-33474
ELASTIC PROPERTIES
Analysis of elastic behavior of orthotropic wood composite plates
N78-33145
Dynamic characterization of poroelastic materials
N78-33147
ELASTIC SCATTERING
The elastic and inelastic scattering of alpha particles by oxygen-16
N78-33906
ELASTOHYDRODYNAMICS
Drag reducing fluids. A bibliography with abstracts
[NTIS/PS-78/0730/8] N78-33402
The practical impact of elastohydrodynamic lubrication
[NASA-TM-78987] N78-33445
Minimum film thickness in elliptical contacts for different regimes of fluid-film lubrication
[NASA-TP-1342] N78-33447
ELASTOPLASTICITY
Room-temperature inelastic test of a nozzle-to-spherical-shell model subjected to pressure and moment loading
[ORNL/TM-6170] N78-33490
ELECTRIC BATTERIES
Lithium-boron alloy anodes for molten salt batteries [2]
[AD-A057258] N78-33544
Development of high-efficiency cost-effective, zinc-chlorine batteries for utility peak-shaving, 1976
[EPRI-EM-711] N78-33590
Lithium batteries, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0660/7] N78-33603
Lithium batteries. Citations from the engineering index data base
[NTIS/PS-78/0661/5] N78-33604
ELECTRIC BRIDGES
Comparative studies of the steady state and RF properties of proximity effect bridges
N78-33961
ELECTRIC CHARGE
Lead batteries. Citations from the engineering index data base
[NTIS/PS-78/0690/4] N78-33606
ELECTRIC CONNECTORS
Charge condition at the junction of unequal radii wires. Part 2: Current distribution on thick cylindrical structures
[AD-A056894] N78-33307
ELECTRIC CURRENT
B-1 EMUX automated logic diagrammer demonstration program
[AD-A056964] N78-33092
ELECTRIC DIPOLES
Groundwave propagation and radiation patterns of a vertical electric dipole over a radially varying surface impedance plane
N78-33282
Excitation of current on an infinite horizontal wire over the earth by an arbitrary electric dipole source
[AD-A057257] N78-33346
ELECTRIC FIELD STRENGTH
Early results from ISEE-A electric field measurements
[NASA-TM-79633] N78-33339
ELECTRIC FIELDS
Flight data of electric field thunderstorm research international project, trip 76, July 1976
[NASA-CR-15779] N78-33693
Biological effects of high strength electric fields on small laboratory animals
[HCP/T1830-03] N78-33706
ELECTRIC MOTOR VEHICLES
Lithium batteries, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0660/7] N78-33603
Lithium batteries. Citations from the engineering index data base
[NTIS/PS-78/0661/5] N78-33604
Lead batteries. Citations from the engineering index data base
[NTIS/PS-78/0690/4] N78-33606
ELECTRIC MOTORS
Energy efficiency and electric motors
[HCP/M5021-01] N78-33591
ELECTRIC POTENTIAL
Current voltage characteristics of gallium-arsenide metal epitaxial semiconductor field effect transistors at cryogenic temperatures
N78-33337
Flexible system having two selectable ratios for use with Josephson voltage devices with 2 selectable ratios
[SAND-77-2121C] N78-33356
Research in laser processes
[AD-A056030] N78-33427
ELECTRIC POWER
Environmental development plan for electric energy systems program, 1977
[DOE/EDP-0016] N78-33554
The 1976 energy resource alternatives II competition
[COO-2698-2] N78-33595
ELECTRIC POWER PLANTS
Module/array interface study
[NASA-CR-157774] N78-33533
A 1.5 kW methanol fuel cell powerplant
[AD-A057145] N78-33541
Solar total-energy large-scale experiment at Shenandoah, Georgia
[SAND-77-2075C] N78-33561
Central receiver solar thermal power system. Phase 1. CDRL item 2, pilot plant preliminary design report. Volume 2: System description and system analysis
[SAN-1108-8/1-VOL-2] N78-33571
Assessment of the fuel cell's role in small utilities
[EPRI-EM-696-VOL-1] N78-33576
Projects to expand fuel sources in Eastern states: An update of Information Circular 8725. Survey of Planned or proposed coal mines, coal and noncoal conversion plants, electric generating plants, oil refineries, uranium enrichment facilities, and related infrastructure, in states east of the Mississippi River [as of July 1977]
[BM-IC-8765] N78-33581
MAP3S: Studying the transport, transformation, and fate of atmospheric energy-related pollutants
[DOE/EV-0008/1] N78-33626
Assessment of the role of advanced technologies in small utilities
[EPRI-EM-696-VOL-2] N78-34008
ELECTRIC POWER SUPPLIES
Standard modular power supplies for avionics
[AD-A057159] N78-33100
USAF terrestrial energy study. Volume 3, part 2: Energy conservation systems handbook
[AD-A057252] N78-33542
ELECTRIC POWER TRANSMISSION
Electrical and biological effects of transmission lines: A review
[BPA-BIO-77-1] N78-33722
ELECTRICAL FAULTS
The design of multivalued logic gates and fault detection in multivalued logic networks
N78-33750
ELECTRICAL IMPEDANCE
Groundwave propagation and radiation patterns of a vertical electric dipole over a radially varying surface impedance plane
N78-33282
Time dependent electron and ion flow in pinched beam diodes
[AD-A056362] N78-33908
ELECTRICAL MEASUREMENT
Measurements of dimensional and electrical characteristics of printed boards made with IPC Multi-Purpose Test Pattern, B-25
[SAND-77-1837C] N78-33357
ELECTRICAL RESISTANCE
Measurements of dimensional and electrical characteristics of printed boards made with IPC Multi-Purpose Test Pattern, B-25
[SAND-77-1837C] N78-33357
ELECTRICAL RESISTIVITY
Analysis of a nonlinear electromagnetic field penetration problem
[AD-A056424] N78-33312
Electrical conductivity of selected graphite intercalation compounds in the temperature range between 4 and 300 Kelvin degrees
[AD-A056429] N78-33350
ELECTRO-OPTICS
Non-extractive electro-optical measurement of jet-engine emissions
[AD-A056783] N78-33105
Electro-optical studies
[AD-A057062] N78-33169
ELECTROACOUSTIC WAVES
The storage correlator: Theory and signal processing applications
N78-33327
ELECTROCHEMICAL MACHINING
Electropolishing. Citations from the engineering index data base
[NTIS/PS-78/0712] N78-33275
ELECTROCHEMISTRY
Mass transport and acid-base generation in solution/membrane systems: Extension of Nernst-Planck treatment to electrolytic multicomponent systems
N78-33159
Studies of electrogenerated chemiluminescence
N78-33162
Electrochemical reduction of thionyl chloride in solutions containing lithium tetrachloroaluminate
[AD-A056123] N78-33167

ELECTRODEPOSITION
Electrodeposition of nickel onto steel using a soluble mobile anode
[K-1894] N78-33220
ELECTRODES
Transient and failure analyses of porous zinc electrodes
N78-33187
ELECTROENCEPHALOGRAPHY
The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain
N78-33701
ELECTROLYTES
Vapor-liquid equilibria in multicomponent aqueous solutions of volatile electrolytes
N78-33157
ELECTROLYTIC CELLS
Sealed primary lithium-inorganic electrolyte cell
[AD-A056370] N78-33543
ELECTROMAGNETIC FIELDS
Analysis of a nonlinear electromagnetic field penetration problem
[AD-A056424] N78-33312
Excitation of current on an infinite horizontal wire over the earth by an arbitrary electric dipole source
[AD-A057257] N78-33346
Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation
[JPRS-71910] N78-33727
Cellular and molecular effects and the mechanism of action of microwave electromagnetic fields on biological systems
N78-33728
ELECTROMAGNETIC MEASUREMENT
A method of detecting and characterizing subsurface layers by means of electromagnetic depth sounding
N78-33279
Preliminary studies of electromagnetic sounding of cometary nuclei
[NASA-CR-157764] N78-34022
ELECTROMAGNETIC NOISE
Relationship between noise figures and other performance characteristics of UHF TV receivers
[PB-281172/7] N78-33318
ELECTROMAGNETIC PULSES
On the radiation damping of high externally resonant electromagnetic systems
[AD-A056316] N78-33317
ELECTROMAGNETIC RADIATION
Electromagnetic radiation analysis
[AD-A056647] N78-33294
ELECTROMAGNETIC SCATTERING
Source radiation in the presence of smooth convex bodies
[AD-A056645] N78-33296
Charge condition at the junction of unequal radii wires. Part 2: Current distribution on thick cylindrical structures
[AD-A056894] N78-33307
ELECTROMAGNETIC SHIELDING
Evaluation of a triaxial SQUID magnetometer designed for use as an ELF magnetic antenna
[AD-A056361] N78-33293
Analysis of a nonlinear electromagnetic field penetration problem
[AD-A056424] N78-33312
ELECTROMAGNETIC WAVE TRANSMISSION
Propagating modes on a buried leaky coaxial cable
[AD-A057253] N78-33308
ELECTRON ACCELERATORS
Proceedings of the Second International Topical Conference on high Power Electron and Ion Beam Research and Technology, volume 2
[AD-A057219] N78-33897
ELECTRON BEAM WELDING
Computer automation on an electron-beam welder with automatic, stored seam tracking
[Y-2114] N78-33452
ELECTRON BEAMS
IC fabrication using electron-beam technology
[AD-A056717] N78-33343
Analysis of electron retarding potential analyzer measurements of vehicle skin potential in the PRECEDE experiment
[AD-A057250] N78-33347
Effect of a dc electric field on beam trapping
[AD-A056789] N78-33354
Electron beam pumped vapor phase dye lasers
N78-33423
Proceedings of the Second International Topical Conference on High Power Electron and Ion Beam Research and Technology, volume 1
[AD-A057218] N78-33896
Proceedings of the Second International Topical Conference on high Power Electron and Ion Beam Research and Technology, volume 2
[AD-A057219] N78-33897
Equilibrium and nonlocal stability properties of bounded relativistic electron beam-plasma systems
N78-33923
Modulated electron beam heating of a contact ionized lithium plasma in a mirror machine
N78-33924
Excitation of large amplitude plasma waves by runaway electrons --- tokamak devices
[AD-A056788] N78-33934
ELECTRON CYCLOTRON HEATING
High beta capture and mirror confinement of laser produced plasmas --- electron cyclotron resonance heating
[COO-2277-10] N78-33946
ELECTRON DENSITY (CONCENTRATION)
Test particle correlation by a whistler wave in a nonuniform magnetic field
[AD-A057065] N78-33302
Behavior of the ionospheric F-region during geomagnetic storms
[AD-A056978] N78-33664
ELECTRON DENSITY PROFILES
Analysis of electron density-profiles in the lower ionosphere
[AD-A057254] N78-33665
ELECTRON DIFFRACTION
Desorption and surface diffusion: Nitrogen on tungsten [110]
[AD-A056346] N78-33165
Electron-spin polarization in low energy electron diffraction from tungsten [001]
N78-33960
ELECTRON ENERGY
Calculation of the energetics and collision dynamics of electronic transition lasers
[AD-A056896] N78-33428
ELECTRON IMPACT
The ionization of uranium atoms by electron impact
N78-33894
Report of progress in the development of an electron impact ionization model
[AD-A056363] N78-33907
ELECTRON MICROSCOPY
Size effects and electron microscopy of thin metal films
[NASA-CR-157746] N78-33194
X-ray analysis of biological specimens
[UR-3490-1341] N78-33704
ELECTRON PUMPING
Electron beam pumped vapor phase dye lasers
N78-33423
ELECTRON SCATTERING
Energy spectra of double-scattered photons
N78-33904
ELECTRON SPIN
Electron-spin polarization in low energy electron diffraction from tungsten [001]
N78-33960
ELECTRON STATES
Extended fine structure above vanadium L-shell appearance potential thresholds
[AD-A057141] N78-33203
Laser induced fluorescence in titanium oxide: Lifetimes, collisions, and intercombinations
N78-33925
ELECTRON TRANSFER
Experimental study of resonant electron transfer in He [+] [+] He and H [+] [+]H collisions at low relative velocities
N78-33888
ELECTRON TRANSITIONS
Calculation of the energetics and collision dynamics of electronic transition lasers
[AD-A056896] N78-33428
An investigation of radiative lifetimes and oscillator strengths for allowed intra L-shell transitions in multiply-charged chlorine ions
N78-33958
ELECTRON TUBES
Time dependent electron and ion flow in pinched beam diodes
[AD-A056362] N78-33908
ELECTRONIC EQUIPMENT
Management information system for ESD program offices
[AD-A056103] N78-33977
ELECTRONIC MODULES
Standard modular power supplies for avionics
[AD-A057159] N78-33100
ELECTRONIC PACKAGING
Interactive electronic circuit simulation on small computer systems with a real time algorithm for ac analysis
N78-33808
ELECTRONS
Electron transport code theoretical basis
[LA-7227-MS] N78-33900
Tokamak confinement
[PPPL-1442] N78-33945
ELECTRONYSTAGMOGRAPHY
The interaction between the utricles and the semicircular canals during eccentric rotation
N78-33714
ELECTROPLATING
Feasibility demonstration for electroplating ultrathin polyimide film --- fabricating film for space erectable structures
[NASA-CR-157775] N78-33266
Effects of deburring contaminants on electroplating adhesion
[BDX-613-1757-REV] N78-33397
LASL laser mirror program: Excerpts from 1/-12 Development Division
[Y-DA-7591] N78-33436
ELECTROPOLISHING
Electropolishing. Citations from the engineering index data base
[NTIS/PS-78/0712] N78-33275
ELECTROSTATIC PROBES
The behavior of gridded spherical and planar electron probes in a non-Maxwellian plasma
[AD-A056961] N78-33933
ELECTROSTATICS
Deposition of suspensions in laminar flow in the entrance region of channels with diffusive, electrostatic and gravitational effects
N78-33369
ELLIPSOMETERS
Ellipsometric determination of properties of films on rough surfaces such as aluminum alloy aircraft skin
[AD-A056782] N78-33413
ELLIPTIC DIFFERENTIAL EQUATIONS
Dynamic ADI methods for elliptic equations with gradient dependent coefficients
N78-33826
An efficient direct solver for separable and nonseparable elliptic equations
[AD-A056360] N78-33835
ELLIPTICAL ORBITS
Station keeping of the space shuttle in the vicinity of a deployed payload
[AD-A056109] N78-33136
EMISSION SPECTRA
Analysis of electron retarding potential analyzer measurements of vehicle skin potential in the PRECEDE experiment
[AD-A057250] N78-33347
Characteristics of amplified spontaneous emissions in high-gain gas-laser amplifiers
N78-33419
Development and characterization of miniature inductively coupled plasma source for atomic emission spectrometry
[AD-A056139] N78-33932
EMPLOYER RELATIONS
Agencies, implementation of and compliance with the Privacy Act can be improved
[PB-281768/2] N78-33997
ENCAPSULATING
Evaluation available encapsulation materials for low-cost long-life silicon photovoltaic arrays
[NASA-CR-157758] N78-33535
ENERGY ABSORPTION FILMS
Cu/sub x/S-{Cd, Zn}S photovoltaic solar energy converters
[HCP/T7405-1] N78-33582
ENERGY BANDS
A model calculation for the interaction of hydrogen with transition metals: H in Ni
N78-33173
ENERGY CONSERVATION
Aerial thermography for energy conservation
[NASA-TM-78959] N78-33510
Applications of thermal energy storage in the cement industry
[NASA-CR-159399] N78-33537
Voluntary business energy conservation program
[DOE/CS-0018/6] N78-33548
Limits to energy conservation in chemical processes
[ORAU/IEA-78-6[M]] N78-33550
Minimum Energy Dwelling (MED) workbook: An investigation of techniques and materials for energy conscious design
[SAN-1198-1] N78-33553
Environmental development plan for Conservation Research and Technology Program, 1977
[DOE/EDP-0017] N78-33555
Commercial demand for energy: A disaggregated approach
[ORNL/CON-15] N78-33570
Energy efficiency and electric motors
[HCP/M50217-01] N78-33591
ENERGY CONSUMPTION
Commercial demand for energy: A disaggregated approach
[ORNL/CON-15] N78-33570
Energy efficiency and electric motors
[HCP/M50217-01] N78-33591
ENERGY CONVERSION
Hot corrosion/erosion testing of materials for applications for advanced power conversion systems using coal-derived fuels. Task 2. Evaluation of turbine materials for use in a coal-fired fluidized bed combustion environment
[FE-2326-20] N78-33210
USAF terrestrial energy study. Volume 3, part 2: Energy conservation systems handbook
[AD-A057252] N78-33542
Contribution of chemistry to energy
[LA-UR-78-706] N78-33559
Institutional applications of solar total energy systems
[ALO-3786-2] N78-33569

Solar-thermal conversion to electricity utilizing a central receiver, open-cycle gas turbine design
[EPRI-ER-652] N78-33587

ENERGY LEVELS
Nuclear lifetimes in manganese-52
N78-33905

ENERGY POLICY
Department of Energy position paper on alcohol fuels
[DOE/US-0001/1] N78-33256
Floating substrate process: Large-area silicon sheet task low-cost solar array project
[NASA-CR-157759] N78-33265
Evaluation of geothermal energy exploration and resource assessment, volume 1: A review of geothermal subsidence modeling
[SAN-1269-1-VOL-1] N78-33515
Land use planning issues and the Alaska gas pipeline: A report to the President
[PB-281327/7] N78-33522
High-temperature linear radiation-cavity solar collector with a Fresnel concentrator
N78-33524
Development of flat-plate solar collectors for the heating and cooling of buildings: Executive summary
[NASA-CR-134804] N78-33527
Installation package for Sunpak solar collectors
[NASA-CR-150802] N78-33528
Development and fabrication of a concentrating solar collector subsystem
[NASA-CR-150787] N78-33529
Solar heat transport fluid
[NASA-CR-150806] N78-33530
Design package for a complete residential solar space heating and hot water system
[NASA-CR-150795] N78-33531
Applications of thermal energy storage in the cement industry
[NASA-CR-159399] N78-33537
USAF terrestrial energy study. Volume 3, part 2: Energy conservation systems handbook
[AD-A057252] N78-33542
Compressed air energy storage advanced systems analysis
[PNL-2464] N78-33545
Appraisal of energy analysis
[EPRI-EA-504] N78-33547
Voluntary business energy conservation program
[DOE/CS-0018/6] N78-33548
Federal-assistance programs and energy-development-impacted municipalities
[FEA/D-77/039] N78-33549
Limits to energy conservation in chemical processes
[ORAU/IEA-78-6[M]] N78-33550
Potential for cogeneration development in six major industries by 1985
[HCP/M60172-01/2] N78-33551
Thermal conversion of oil-shale kerogen using CO and water at elevated pressures
[LERC-78/1] N78-33552
Environmental development plan for the Division of Transportation energy conservation, 1977
[DOE/EDP-0018] N78-33556
Simple economic model for energy research and supply strategies, draft
[DOE/ER-0005/D] N78-33557
Preliminary optimization model for assessment of energy development in the Rocky Mountain region
[LA-6689-MS] N78-33558
Contribution of chemistry to energy
[LA-UR-78-706] N78-33559
Study of heat engine/flywheel: Hybrid propulsion configuration with electrical transmission system, phase I
[ALO-41/1] N78-33560
Solar total-energy large-scale experiment at Shenandoah, Georgia
[SAND-77-2075C] N78-33561
Demonstration project as a procedure for accelerating the application of new technology. Charpie task force report, volume I
[DOE/RA-0003/1-VOL-1] N78-33563
Demonstration project as a procedure for accelerating the application of new technology. Charpie task force report, volume 2
[DOE/RA-0003/2-VOL-2] N78-33564
Analysis of federal incentives used to stimulate energy production: An executive summary
[PNL-2410] N78-33565
Environmental Development Plan [EDP]: Solar agricultural and industrial process heat, 1977
[DOE/EDP-0002] N78-33568
Commercial demand for energy: A disaggregated approach
[ORNL/CON-15] N78-33570
Central receiver solar thermal power system. Phase 1. CDRL item 2, pilot plant preliminary design report. Volume 2: System description and system analysis
[SAN-1108-8/1-VOL-2] N78-33571
OTEC thermal resource report for Hawaii
[TID-27950] N78-33573
Phoenix House: Solar-assisted heat pump system evaluation
[EPRI-ER-712] N78-33574
Open cycle ocean thermal energy conversion: A preliminary engineering evaluation
[ALO-3723-76/3] N78-33575
Assessment of the fuel cell's role in small utilities
[EPRI-EM-696-VOL-1] N78-33576
Investigation of alternate types of water-storage components to be utilized in conjunction with the ACES system
[ORNL/SUB-78/14233/1] N78-33578
Environmental Development Plan [EDP]: Energy storage systems, FY 1977
[DOE/EDP-0015] N78-33579
Geothermal well completions: An overview of existing methods in four types of developments
[SAND-78-7010] N78-33580
Projects to expand fuel sources in Eastern states: An update of Information Circular 8725. Survey of Planned or proposed coal mines, coal and noncoal conversion plants, electric generating plants, oil refineries, uranium enrichment facilities, and related infrastructure, in states east of the Mississippi River [as of July 1977]
[BM-IC-8765] N78-33581
Solar-thermochemical production of hydrogen from water
[LA-UR-78-1052] N78-33586
Passenger car fuel economy in short trip operation
[COO-4248-1] N78-33592
Federal wind energy program. Program summary
[DOE/ET-0023/1] N78-33594
ERDA facilities: A national resource for resolving energy problems
[ERDA-77-80] N78-33597
Biomass energy success stories: A portfolio illustrating current economic uses of renewable biomass energy
[HCP/T0285-02] N78-33598
Fuel consumption: Industrial, residential, and general studies. Volume 1. A bibliography with abstracts
[NTIS/PS-78/0709/2] N78-33601
Fuel consumption: Industrial, residential, and general studies. Volume 2. A bibliography with abstracts
[NTIS/PS-78/0710/0] N78-33602
The multiprogram laboratories: A national resource for nonnuclear energy research, development, and demonstration
[PB-281265/9] N78-33607
Heliostat systems design and operation. Citations from the engineering index data base
[NTIS/PS-78/0842/1] N78-33608
Environmental development plan for buildings and community systems, 1977
[DOE/EDP-0020] N78-33622
Symposium proceedings: Environmental aspects of fuel conversion technology, 3
[PB-282429/0] N78-33636
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0666/4] N78-33883
Department of energy's consolidation of information processing activities needs more attention
[PB-281269/1] N78-33996
Evaluation of FIDC system --- fuel vapor injector/igniter and lean limit controller for automobile engines
[NASA-CR-157763] N78-34007

ENERGY SOURCES
Analysis of federal incentives used to stimulate energy production: An executive summary
[PNL-2410] N78-33565

ENERGY SPECTRA
Energy spectra of double-scattered photons
N78-33904

ENERGY STORAGE
Liquids from CO and H2 for energy storage
[EPRI-AF-689] N78-33175
Sealed primary lithium-inorganic electrolyte cell
[AD-A056370] N78-33543
Compressed air energy storage advanced systems analysis
[PNL-2464] N78-33545
Contribution of chemistry to energy
[LA-UR-78-706] N78-33559
Environmental Development Plan [EDP]: Energy storage systems, FY 1977
[DOE/EDP-0015] N78-33579
Analysis of off-guideway energy storage/propulsion systems for dual mode transit systems
[UCRL-80874] N78-33589

ENERGY TECHNOLOGY
Floating substrate process: Large-area silicon sheet task low-cost solar array project
[NASA-CR-157759] N78-33265
Significance of process variables on liquid effluent production in coal gasification
N78-33525
Hydrogen-fueled engine
[NASA-CASE-NPO-13763-1] N78-33526
Engineering and economic feasibility of utilizing geothermal heat from the Heber reservoir for industrial processing purposes at Valley Nitrogen Producers Inc., El Centro agricultural chemical plant
[SAN-1323-3] N78-33562
Demonstration project as a procedure for accelerating the application of new technology. Charpie task force report, volume 1
[DOE/RA-0003/1-VOL-1] N78-33563
Demonstration project as a procedure for accelerating the application of new technology. Charpie task force report, volume 2
[DOE/RA-0003/2-VOL-2] N78-33564
Analysis of federal incentives used to stimulate energy production: An executive summary
[PNL-2410] N78-33565
Solar total energy system: Large scale experiment. Phase 2: Conceptual design
[SE-3986-1] N78-33566
Research on the application of solar energy to industrial drying or dehydration processes
[ORO-5123-1] N78-33583
Solar-thermal conversion to electricity utilizing a central receiver, open-cycle gas turbine design
[EPRI-ER-652] N78-33587
Federal wind energy program. Program summary
[DOE/ET-0023/1] N78-33594
The 1976 energy resource alternatives II competition
[COO-2698-2] N78-33595
MAP3S: Studying the transport, transformation, and fate of atmospheric energy-related pollutants
[DOE/EV-0008/1] N78-33626
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0666/4] N78-33883
Geothermal energy, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0667/2] N78-33884
ESCOE information retrieval system. System description and operation --- information needs of engineers
[FE-2468-26] N78-33985
Assessment of the role of advanced technologies in small utilities
[EPRI-EM-696-VOL-2] N78-34008

ENERGY TRANSFER
Measurements of energy exchange between acoustic fields and non-uniform steady flow fields
N78-33249
Calculation of the energetics and collision dynamics of electronic transition lasers
[AD-A056896] N78-33428
An investigation into the energy exchange processes within a nonequilibrium 4 MHz RF helium plasma
N78-33927
Exciton dynamics and energy transfer in pure and doped manganese fluoride
N78-33965

ENGINE DESIGN
Design and overall performance of four highly loaded, high speed inlet stages for an advanced high-pressure-ratio core compressor
[NASA-TP-1337] N78-33108
Hydrogen-fueled engine
[NASA-CASE-NPO-13763-1] N78-33526

ENTRAINMENT
Viscous entrainment of mass and energy in fluid dynamic energy separation
N78-33376

ENVIRONMENT EFFECTS
Environmental Development Plan [EDP]: Solar agricultural and industrial process heat, 1977
[DOE/EDP-0002] N78-33568
Environmental Development Plan [EDP]: Energy storage systems, FY 1977
[DOE/EDP-0015] N78-33579
Computer simulation of the visual effects of smoke plumes
[LA-UR-78-689] N78-33625
Rain scavenging studies
[COO-1407-65] N78-33676

ENVIRONMENT MANAGEMENT
Environmental development plan for electric energy systems program, 1977
[DOE/EDP-0016] N78-33554
Environmental development plan for Conservation Research and Technology Program, 1977
[DOE/EDP-0017] N78-33555
Environmental development plan for buildings and community systems, 1977
[DOE/EDP-0020] N78-33622

ENVIRONMENT POLLUTION
Environmental noise: The effects of information overload and control over the work environment on performance during and after exposure
N78-33612
Atmospheric and Geophysical Sciences Division, Physics Department program report, FY 1977
[UCRL-51444-77] N78-33624

ENVIRONMENT PROTECTION
Environmental development plan for the Division of Transportation energy conservation, 1977
[DOE/EDP-0018] N78-33556
Symposium proceedings: Environmental aspects of fuel conversion technology, 3
[PB-282429/0] N78-33636

ENVIRONMENTAL ENGINEERING
Environmental Development Plan [EDP]. Enhanced gas recovery, FY 1977
[DOE/EDP-23] N78-33518

ENVIRONMENTAL SURVEYS
Environmental Development Plan [EDP]. Enhanced gas recovery, FY 1977
[DOE/EDP-23] N78-33518
Benefits derived from the outer continental shelf environmental studies program are questionable
[PB-281782/3] N78-33520
Quantitative mapping by remote sensing of an ocean acid-waste dump
[NASA-TP-1275] N78-33617
Computer-aided environmental impact analysis for industrial, procurement, and research Development, test, and evaluation activities: User's manual
[AD-A056997] N78-33620
Urban noise pollution. A bibliography with abstracts
[NTIS/PS-78/0686/2] N78-33634
EPOXY RESINS
Stress-rupture life of Kevlar/epoxy spherical pressure vessels
[UCID-17755-PT-1] N78-33492
EQUIPMENT SPECIFICATIONS
Installation package for Sunpak solar collectors
[NASA-CR-150802] N78-33528
EROSION
Hardened reentry vehicle development program. Erosion-resistant nosetip technology
[AD-A056390] N78-33128
Hot corrosion/erosion testing of materials for applications for advanced power conversion systems using coal-derived fuels. Task 2. Evaluation of turbine materials for use in a coal-fired fluidized bed combustion environment
[FE-2326-20] N78-33210
Ceramics technology readiness development program. Phase 1: Conceptual designs and material screening --- erosion/corrosion resistance
[FE-2786-12] N78-33243
ERROR ANALYSIS
Wire-scanner reentering experiment error estimates
[LA-6959-MS] N78-33418
Robustness of the MINQUE procedure in estimating variance components
N78-33853
ERROR CORRECTING DEVICES
Laser-error-correction control unit for machine tools
[Y-2129] N78-33453
ERROR DETECTION CODES
On the detection of anomalous phase errors
N78-33067
ERROR FUNCTIONS
Relations between bit and block error probabilities under Markov dependence
[PB-281545/4] N78-33995
ESTIMATES
A special purpose linear programming algorithm for obtaining least absolute value estimators in a linear model with dummy variables
[AD-A056762] N78-33796
An analytic study of a minimum chi-2-estimation procedure
N78-33848
A decision theory approach to interval estimation
N78-33856
ESTIMATING
Robustness of the MINQUE procedure in estimating variance components
N78-33853
The application of Doubly Stochastic Poisson Process estimation techniques to optical intensity estimation for Gaussian optical fields
N78-33909
ESTIMATORS
An adaptive orthogonal-series estimator for probability density functions
N78-33849
ETCHING
Ion beam sputtering of fluoropolymers --- etching polymer films and target surfaces
[NASA-TM-79000] N78-33151
ETHANE
Process development studies on the bioconversion of cellulose and production of ethanol
[LBL-6881] N78-33260
EUCLIDEAN GEOMETRY
Topics in computational geometry
[SLAC-206] N78-33839
A study of geometric set-membership classification
[PB-281573/6] N78-33843
Mathematical models of rigid solid objects
[PB-281535/5] N78-33844
EUROPE
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, fall 1976
[AD-A057144] N78-33660
EUTECTIC ALLOYS
Strain enhanced spheroidization and superplastic flow in a lead-tin eutectic alloy, part A. Development of a phenomenological equation for superplastic flow of fine grained materials, part B
N78-33188
EVAPORATORS
Analysis of heat transfer in horizontal tube falling film evaporators
[ANL-OTEC-78-1] N78-33399
EXCITATION
Nearest neighbor spacings of clean vanadium surfaces from extended appearance potential fine structure
[AD-A057142] N78-33202
Excitation of current on an infinite horizontal wire over the earth by an arbitrary electric dipole source
[AD-A057257] N78-33346
Optimum fatigue resistant frames for random base excitation
N78-33477
EXCITONS
Exciton dynamics and energy transfer in pure and doped manganese fluoride
N78-33965
EXHAUST GASES
Results and status of the NASA aircraft engine emission reduction technology programs
[NASA-TM-79009] N78-33102
Pollution Reduction Technology Program for small jet aircraft engines, phase 2
[NASA-CR-159415] N78-33104
Non-extractive electro-optical measurement of jet-engine emissions
[AD-A056783] N78-33105
Turbine engine particulate emission characterization, phase 2
[AD-A057370] N78-33106
Performance characteristics of automotive engines in the United States. Second series, Report No. 1: 1976 Chevrolet Vega 140 [CID [2.3 liters], 2V --- to determine fuel consumption and emissions
[PB-281774/0] N78-33455
Performance characteristics of automotive engines in the United States. Second series, report no. 2: 1976 Chevrolet 305 CID [5.0 liters], 2V --- to determine fuel consumption and emissions
[PB-281775/7] N78-33456
Performance characteristics of automotive engines in the United States. Second series, report no. 3: 1977 Chrysler 225 CID [3.7 liters], 2V --- to determine fuel consumption and emissions
[PB-281776/5] N78-33457
Performance characteristics of automotive engines in the United States. First series, report no. 12: 1975 Perkins diesel 247 CID [4.0 liters], FI --- to determine fuel consumption and emissions
[PB-281777/3] N78-33458
Performance characteristics of automotive engines in the United States. First series, report no. 13: 1975 American Motors, 258 CID [4.2 liters], 1V --- to determine fuel consumption and emissions
[PB-281778/1] N78-33459
The nature and formation of nitrogenous air pollutant emissions from combustion systems
N78-33611
Design criteria for rocket exhaust scrubbers
[PB-282255/9] N78-33637
EXHAUST SYSTEMS
Effects of catalytic reactors on diesel exhaust composition
[PB-281083/6] N78-33628
EXPANSION
Functional expansions in bilinear system analysis
N78-33831
EXPERIMENTAL DESIGN
Design, analysis, and interpretation of screening studies for human factors engineering research, revision
[AD-A056985] N78-33743
An experimental simultaneous multiprocessor organization
N78-33748
Experiment definition and integration study for the accommodation of giant, passive detector of Exotic Particles In the Cosmic Rays [EPIC] payload on shuttle/spacelab missions
[NASA-CR-156842] N78-34025
EXPERIMENTATION
Biological experiments on board Salyut-6
N78-34032
EXPLORATION
Survey of environmental regulations applying to geothermal exploration, development, and use
[PB-281023/2] N78-33672
Geothermal energy. Part 1: Exploration, volume 3. Citations from NTIS data base
[NTIS/PS-78/0664/9] N78-33881
EXPLOSIONS
Lagrangian finite-difference calculations of an explosion in a partially water-filled rigid cylindrical tank
[SAND-77-1394] N78-33488
EXPLOSIVES
Classification testing of composition A5 and selected pyrotechnics
[NASA-CR-157744] N78-33251
Analysis of impurities in composition B by thin layer chromatography
[AD-A056313] N78-33255
EXTENSIONS
Extension mechanisms for high-level programming languages
N78-33775
EXTREMELY LOW FREQUENCIES
ELF propagation in a non-stratified earth-ionosphere waveguide
[AD-A056143] N78-33295
EXTRUDING
Computer-aided design and manufacturing for extrusion of aluminum, titanium and steel structural parts. Phase 2: Application to practical extrusions. Volume 1: Description of CAD/CAM systems for extrusion of structural shapes
[AD-A056965] N78-33200
Computer-aided design and manufacturing for extrusion of aluminum, titanium and steel structural parts. Phase 2: Application to practical extrusions. Volume 2: User's manual for ALEXTR system of computer programs for design and manufacture of flat-face dies for aluminum extrusion
[AD-A056966] N78-33201

F

F REGION
Analysis of stress ionograms
[AD-A056388] N78-33659
F-8 AIRCRAFT
A learning control system with application to flight systems
N78-33112
F-111 AIRCRAFT
An investigation of wing buffeting response at subsonic and transonic speeds: Phase 1: F-111A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152109] N78-33113
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152110] N78-33114
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152111] N78-33115
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2 F-3A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152112] N78-33116
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152113] N78-33117
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152114] N78-33118
FABRICATION
Feasibility demonstration for electroplating ultra-thin polyimide film --- fabricating film for space erectable structures
[NASA-CR-157775] N78-33266
The design and operation of an automated, high-efficiency photoionization mass spectrometer
[AD-A056269] N78-33412
Design of CPC photovoltaic solar collectors
[CONF-780114-8] N78-33585
FACTOR ANALYSIS
Design, analysis, and interpretation of screening studies for human factors engineering research, revision
[AD-A056985] N78-33743
FAILURE ANALYSIS
Transient and failure analyses of porous zinc electrodes
N78-33187
Estimation and testing of hypotheses for distributions in accelerated life tests
[AD-A056096] N78-33465
Fault trees: Sensitivity of estimated failure probabilities to problem presentation
[AD-A057163] N78-33837
FAILURE MODES
The accelerating nature of electrical bias on moisture induced failures of MOS/LSI devices
N78-33336
FAR FIELDS
Laser far-field beam-profile measurements by the focal plane technique
[PB-281542/1] N78-33438
FAR INFRARED RADIATION
Anomalous dispersion and the pumping of far infrared [FIR] lasers
[NASA-TM-79596] N78-33424
Optical gain in optically pumped methanol and its application to a FIR preamplifier
N78-33912
Far infrared cyclotron resonance in semiconducting lead telluride
N78-33950
FARADAY EFFECT
Effect of a nonlinear refractive index on Faraday rotation
N78-33903

FAST FOURIER TRANSFORMATIONS
An analog FFT beamformer for acoustic applications
[AD-A057057] N78-33879
FAST NEUTRONS
Fast neutron depth dose distributions in a heterogeneous phantom
N78-33712
FATIGUE [MATERIALS]
Effect of microstructure on fatigue properties of Ti-6Al-4V
N78-33189
Low cycle corrosion fatigue and corrosion fatigue crack propagation of high strength 7000-type aluminum alloys
N78-33191
Compilation of fatigue data for Incoloy 800 alloys
[ANL/MSD-78-3] N78-33217
Rolling element fatigue testing of gear materials
[NASA-CR-135450] N78-33463
FATIGUE LIFE
A technique for assessing the durability of structural adhesives
[AD-A057197] N78-33235
ASME report on chemical effects of lubrication in contact fatigue, volume 2
[PB-280980/4] N78-33245
FATIGUE TESTS
ASME report on chemical effects of lubrication in contact fatigue, volume 2
[PB-280980/4] N78-33245
FEASIBILITY ANALYSIS
Mechanization of blended A sub N mode for CCV YF-16
[AD-A056553] N78-33089
Feasibility study of acoustic ultrasonic flowmeters for solid/gas systems
[ANL-FE-49622-TM01] N78-33416
FEDERAL BUDGETS
Federal-assistance programs and energy-development-impacted municipalities
[FEA/D-77/039] N78-33549
FEEDBACK CONTROL
Closed loop control systems. Part 1: Aircraft. A bibliography with abstracts
[NTIS/PS-78/0809/0] N78-33122
Closed loop control systems. Part 2: Miscellaneous applications. A bibliography with abstracts
[NTIS/PS-78/0810/8] N78-33278
Prediction, evaluation, and specification of closed loop and multiaxis flying qualities
[AD-A056983] N78-33736
Multiple access channels with generalized feedback
N78-33745
FERMI SURFACES
Radio frequency size effect measurements on the Fermi surface of rhenium
N78-33962
FERRITES
Localized corrosion and stress corrosion cracking behavior of austenitic stainless steel weldments containing retained ferrite
[COO-2462-4] N78-33213
Ferrite microwave electronics, volume 3. A bibliography with abstracts
[NTIS/PS-78/0738/1] N78-33363
FERROMAGNETISM
Magnetic properties of two dilute spin systems --- amorphous metals
N78-33957
FERTILIZERS
Nitrate and phosphorus runoff losses from small watersheds in Great Lakes Basin
[PB-281275/8] N78-33633
FIBER OPTICS
Fiber-optic time domain reflectometer
[LA-UR-78-824] N78-33415
Fiber optics, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0713/4] N78-33918
Fiber optics, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0714/2] N78-33919
Fiber optics, volume 2. Citations from the engineering index data base
[NTIS/PS-78/0715/9] N78-33920
Fiber optics, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0716/7] N78-33921
FIELD THEORY (ALGEBRA)
Lattice field theories: Non-perturbative methods of analysis
[SLAC-PUB-2073] N78-33975
FIELD THEORY (PHYSICS)
Kinetic transport properties of a bumpy torus with finite radial ambipolar field
[ORNL/TM-6215] N78-33942
FIGHTER AIRCRAFT
Encyclopedia of US Air Force aircraft and missile systems. Volume 1: Post-World War II fighters 1945 - 1973
[AD-A057002] N78-33036
FILE MAINTENANCE [COMPUTERS]
X10: A FORTRAN direct access data management system
N78-33784
Optimal branching probabilities and their relationship to computer network file distribution
N78-33809
FILM BOILING
Analysis of heat transfer in horizontal tube falling film evaporators
[ANL-OTEC-78-1] N78-33399
FILM CONDENSATION
Forced flow laminar filmwise condensation of a pure saturated vapor in a vertical tube
N78-33367
FILM COOLING
Direct measurements and analysis of skin friction and cooling downstream of multiple flush-slot injection into a turbulent Mach 6 boundary layer
[NASA-TP-1176] N78-33385
FILM THICKNESS
Minimum film thickness in elliptical contacts for different regimes of fluid-film lubrication
[NASA-TP-1342] N78-33447
FILTERS
Investigation of HEPA filters subjected to tornado pressure pulses: Initial structural testing
[LA-7202-MS] N78-33394
FINE STRUCTURE
Nearest neighbor spacings of clean vanadium surfaces from extended appearance potential fine structure
[AD-A057142] N78-33202
FINITE DIFFERENCE THEORY
Derivation and evaluation of an approximate analysis for three-dimensional viscous subsonic flow with large secondary velocities --- finite difference method
[NASA-CR-159430] N78-33044
Creation of lumped parameter thermal model by the use of finite elements
[NASA-CR-158944] N78-33479
Lagrangian finite-difference calculations of an explosion in a partially water-filled rigid cylindrical tank
[SAND-77-1394] N78-33488
FINITE ELEMENT METHOD
Stress analysis of ceramic turbine blades by finite element method, part 1
[AD-A056310] N78-33111
Analysis of elastic behavior of orthotropic wood composite plates
N78-33145
Analysis/design of strip reinforced random composites [strip hybrids]
[NASA-TM-78985] N78-33149
NACHOS: A finite element computer program for incompressible flow problems. Part 1: Theoretical background
[SAND-77-1333-PT-1] N78-33395
A finite element method for problems involving the Helmholtz equation in two dimensional exterior regions
N78-33823
Shifted incomplete Cholesky factorization --- linear systems and matrix theory
[SAND-78-8226] N78-33841
FINLAND
A new Finnish ionosonde IS-14
[REPT-28] N78-33648
FIRE PREVENTION
Learning from fire: A fire protection primer for architects
[PB-283163/4] N78-33277
FIRES
Learning from fire: A fire protection primer for architects
[PB-283163/4] N78-33277
FIXED POINT ARITHMETIC
Network aggregation in transportation planning. Volume 2: A fixed point method for treating traffic equilibria
[PB-281385/5] N78-34012
FIXED WINGS
A theoretical and experimental study of circulation control with reference to fixed wing applications
[RP-582] N78-33052
FIXTURES
Development of a cryogenic rotating heat pipe joint
[NASA-CR-152188] N78-33384
FLAMES
Computational study of physical and chemical flame inhibition
[LBL-6899] N78-33181
FLAT PLATES
Development of flat-plate solar collectors for the heating and cooling of buildings: Executive summary
[NASA-CR-134804] N78-33527
Flat plate solar collector design and performance. Citations from the engineering index data base
[NTIS/PS-78/0841/3] N78-33610
FLIGHT CONTROL
A theoretical and experimental study of circulation control with reference to fixed wing applications
[RP-582] N78-33052
A learning control system with application to flight systems
N78-33112
Engineering and development program plan: Advanced Integrated Flight Systems [AIFS]
[AD-A056770] N78-33119
FLIGHT CREWS
Air Force aircrew training devices: Master plan
[AD-A056940] N78-33734
FLIGHT HAZARDS
Bird strikes and aviation safety. A bibliography with abstracts
[NTIS/PS-78/0694/6] N78-33066
FLIGHT LOAD RECORDERS
Comparison of concurrent strain gage- and pressure transducer-measured flight loads on a lifting reentry vehicle and correlation with wind tunnel predictions
[NASA-TP-1331] N78-33053
FLIGHT SAFETY
Annual review of aircraft accident data, US air carrier operations, 1976
[PB-281329/3] N78-33065
Vortex advisory system simulation of Chicago O'Hare Airport
[AD-A057112] N78-33069
Dynamical model of gust front
[PB-283425/7] N78-33692
FLIGHT SIMULATION
Prediction, evaluation, and specification of closed loop and multiaxis flying qualities
[AD-A056983] N78-33736
Program documentation for the terrain and flight dynamics program --- computer graphics for flight simulation
[AD-A056116] N78-33742
FLIGHT SIMULATORS
Development of a symbology exerciser for display generation and analysis on the visually-coupled airborne systems simulator [VCASS]
[AD-A055464] N78-33124
Effects of platform motion, visual and G-seat factors upon experienced pilot performance, in the flight simulator
[AD-A055691] N78-33739
G-seat component development
[AD-A055533] N78-33740
Emulation of an advanced G-seat on the advanced simulator for pilot training
[AD-A055532] N78-33741
FLIGHT TESTS
Missile aerodynamic parameter and structure identification from flight test data
[AD-A056343] N78-33055
TRSB microwave landing system demonstration program at Shiraz, Iran
[AD-A055526] N78-33071
Continuous Kalman updating of an inertial navigation system using terrain measurements
[SAND-78-0421C] N78-33083
Bell UH-1H RAM/LOG report
[AD-A057231] N78-33091
An investigation of wing buffeting response at subsonic and transonic speeds: Phase 1: F-111A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152109] N78-33113
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152110] N78-33114
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152111] N78-33115
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2 F-3A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152112] N78-33116
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152113] N78-33117
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152114] N78-33118
FLIGHT TRAINING
Air Force aircrew training devices: Master plan
[AD-A056940] N78-33734
FLIR DETECTORS
Algorithms and hardware technology for image recognition
[AD-A057191] N78-33821
FLOOD PREDICTIONS
Regional flood analyses and land use planning in an area of inadequate data Santa Cruz County, California
N78-33501
FLOW DISTRIBUTION
A theoretical and experimental study of circulation control with reference to fixed wing applications
[RP-582] N78-33052
A photographic technique to obtain droplet and flow pattern data in two-phase flow for use in modeling
N78-33371

A perturbation analysis of the steady integral flow and heat transport of gases in rod bundles, Part 1: Asymptotic analysis of plane turbulent Couette-Poiseuille flows, Part 2
N78-33372
The calibration and application of five-hole probes
[NASA-CR-157735] N78-33387
An approximate method for calculating the mean streamlines of the direct problem of an open rotor
[AD-A057151] N78-33388

FLOW EQUATIONS
A perturbation analysis of the steady integral flow and heat transport of gases in rod bundles, Part 1: Asymptotic analysis of plane turbulent Couette-Poiseuille flows, Part 2
N78-33372

FLOW GEOMETRY
Propagation of sound through a sheared flow
[NASA-CR-152196] N78-33876

FLOW MEASUREMENT
Axisymmetric air jet impinging on a hemispherical concave plate
N78-33039
Measurement and analysis of flow in ducts and rod bundles
N78-33377
Optical measurement methods in thermogasdynamics
[NASA-TM-75333] N78-33915
Local measurements in two-phase liquid-metal MHD
[CONF-780336-2] N78-33943

FLOW VELOCITY
Derivation and evaluation of an approximate analysis for three-dimensional viscous subsonic flow with large secondary velocities --- finite difference method
[NASA-CR-159430] N78-33044

FLOW VISUALIZATION
A visual investigation of turbulence in stagnation flow about a circular cylinder
[NASA-CR-3019] N78-33386
Evolution of an FR-80 generated movie of opposed jet fluid flow
[K/CSD/INF-78/15] N78-33393

FLOWMETERS
Conversion from film to magnetic cassette recording for current meter
[AD-A056962] N78-33409
Feasibility study of acoustic ultrasonic flowmeters for solid/gas systems
[ANL-FE-49622-TM01] N78-33416

FLUID BOUNDARIES
Natural convection in a thermally stratified fluid
N78-33373

FLUID DYNAMICS
Viscous entrainment of mass and energy in fluid dynamic energy separation
[PB-281759/1] N78-33401

FLUID FILMS
Analysis of heat transfer in horizontal tube falling film evaporators
[ANL-OTEC-78-1] N78-33399
Minimum film thickness in elliptical contacts for different regimes of fluid-film lubrication
[NASA-TP-1342] N78-33447

FLUID FLOW
Streaming birefringence in extensional flow of polymer solutions
N78-33365
Analytical studies of steady and non-steady motions of a bubbly liquid
N78-33375
Evolution of an FR-80 generated movie of opposed jet fluid flow
[K/CSD/INF-78/15] N78-33393
Numerical methods in fluid flow problems, volume 3. A bibliography with abstracts
[NTIS/PS-78/0823/1] N78-33403
Numerical methods in fluid flow problems, volume 4. A bibliography with abstracts
[NTIS/PS-78/0824/9] N78-33404

FLUID INJECTION
Transient flow of non-Newtonian power-law fluids in porous media
N78-33374
Direct measurements and analysis of skin friction and cooling downstream of multiple flush-slot injection into a turbulent Mach 6 boundary layer
[NASA-TP-1176] N78-33385

FLUID MECHANICS
Rayleigh-Brillouin scattering and structural relaxation of a viscoelastic liquid
[AD-A056763] N78-33389

FLUIDIZED BED PROCESSORS
Hot corrosion/erosion testing of materials for applications for advanced power conversion systems using coal-derived fuels. Task 2. Evaluation of turbine materials for use in a coal-fired fluidized bed combustion environment
[FE-2326-20] N78-33210
Use of microwave energy in conjunction with fluidized bed reactors
[CONF-771125-3] N78-33588

FLUORESCENCE
Sub-part-per-trillion detection of organics in aqueous solution by laser induced molecular fluorescence
[UCRL-80038] N78-33174
Investigations of resonance fluorescence --- quantum electrodynamics and Heisenberg theory
N78-33892
Laser induced fluorescence in titanium oxide: Lifetimes, collisions, and intercombinations
N78-33925

FLUOROPOLYMERS
Ion beam sputtering of fluoropolymers --- etching polymer films and target surfaces
[NASA-TM-79000] N78-33151

FLUX [RATE]
Observability of the neutrino flux from the inner region of the galactic disk
[NASA-TM-79658] N78-34026

FLUX DENSITY
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152110] N78-33114
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152111] N78-33115
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152113] N78-33117

FLYWHEELS
Study of heat engine/flywheel: Hybrid propulsion configuration with electrical transmission system, phase I
[ALO-41/1] N78-33560

FOAMS
A study on thermoplastic structural foam --- dynamics of gas bubbles
N78-33229

FOCUSING
Experimental determination of single and multiple pulse propagation
[AD-A055570] N78-33426

FOG
Fog prediction. A bibliography with abstracts
[NTIS/PS-78/0775/3] N78-33694

FOKKER-PLANCK EQUATION
A discrete ordinates solution of the time-dependent Fokker-Planck equation
N78-33827

FORECASTING
Forecasting and whitening filter estimation
[AD-A056540] N78-33836

FORTRAN
AFSATCOM life cycle cost model
[AD-A056102] N78-33131
X10: A FORTRAN direct access data management system
N78-33784
Four FORTRAN programs for numerically solving Helmholtz's equation in an arbitrary bounded planar region
[LBL-7516] N78-33798

FOURIER TRANSFORMATION
Performance, evaluation, and specification for coherent optical processors
N78-33911

FRACTURE MECHANICS
Microstructurally developed toughening mechanisms in ceramics. Stress induced martensitic reaction. 2: Experiments in the ZRO2-Y2-O3 system
[AD-A057240] N78-33232
Microstructurally developed toughening mechanisms in ceramics. Fracture toughness of Si3N4 as a function of the initial alpha-phase content
[AD-A057241] N78-33233
EPRI ductile fracture research review document --- nuclear pressure vessels
[EPRI-NP-701-SR] N78-33489
Mathematical analysis of stress cracks, volume 1. A bibliography with abstracts
[NTIS/PS-78/0768/8] N78-33498
Cleavage behavior as a function of composition for single crystals of the Mo-Nb system
[COO-3476-15] N78-33972

FRACTURE STRENGTH
Microstructurally developed toughening mechanisms in ceramics. Stress-induced martensitic reactions. 1: Theory of metastable phase retention and contribution to fracture toughness
[AD-A057239] N78-33231
Microstructurally developed toughening mechanisms in ceramics. Compressive surface stresses developed in ceramics by an oxidation-induced phase change
[AD-A057242] N78-33234

FRAGMENTATION
Fragmentation of relativistic light nuclei: Longitudinal and transverse momentum distributions
N78-33902

FRAMES
Optimum fatigue resistant frames for random base excitation
N78-33477

FREE BOUNDARIES
Natural convection in a thermally stratified fluid
N78-33373

FREE CONVECTION
Natural convection in a thermally stratified fluid
N78-33373

FREE JETS
An experimental study of non-equilibrium free jet expansions of nitrogen
N78-33037

FREE VIBRATION
An approximate solution for the free vibrations of rotating uniform cantilever beams
[NASA-TM-X-62299] N78-33289

FREEZING
An experimental study of the cracked nozzle problem occurring in pressure vessels
N78-33471
Volume-restricted freezing of living cells and tissues
[ORNL/MIT-265] N78-33705

FREON
An experimental investigation of the critical supersaturation of five vapors in a shock tube --- Freon benzene, carbon tetrachloride, water and heavy water
[AD-A056859] N78-33172

FREQUENCY ASSIGNMENT
Alternatives for future personal radio services, volume I
[PB-280938/2] N78-33320
Alternatives for future personal radio services, volume 2
[PB-280939/0] N78-33321

FREQUENCY CONVERTERS
The 15kW general purpose power conditioner (frequency changer). AC-DC section
[AD-A056302] N78-33353

FREQUENCY DISTRIBUTION
Comparative studies of the steady state and RF properties of proximity effect bridges
N78-33961

FREQUENCY MODULATION
An investigation of the possible uses of the normal mode helical antenna in the tactical army
[AD-A056324] N78-33314

FREQUENCY STABILITY
Surface acoustic wave stabilized oscillators: Additional aging results
[NASA-CR-156833] N78-33340

FREQUENCY STANDARDS
Study of improvement of hydrogen maser frequency standard
[NASA-CR-156836] N78-33425

FRESNEL REFLECTORS
High-temperature linear radiation-cavity solar collector with a Fresnel concentrator
N78-33524

FRICTION MEASUREMENT
Direct measurements and analysis of skin friction and cooling downstream of multiple flush-slot injection into a turbulent Mach 6 boundary layer
[NASA-TP-1176] N78-33385

FRONTS [METEOROLOGY]
Dynamical model of gust front
[PB-283425/7] N78-33692

FUEL CELLS
Reversible metal hybride-air fuel cell
[AD-A056591] N78-33540
A 1.5 kW methanol fuel cell powerplant
[AD-A057145] N78-33541
Assessment of the fuel cell's role in small utilities
[EPRI-EM-696-VOL-1] N78-33576
Catalyst sintering studies --- phosphoric acid fuel cells
[EPRI-EM-661] N78-33577

FUEL COMBUSTION
Results and status of the NASA aircraft engine emission reduction technology programs
[NASA-TM-79009] N78-33102
The nature and formation of nitrogenous air pollutant emissions from combustion systems
N78-33611

FUEL CONSUMPTION
Preliminary design characteristics of a subsonic business jet concept employing laminar flow control
[NASA-CR-158958] N78-33087
Performance characteristics of automotive engines in the United States. Second series, Report No. 1: 1976 Chevrolet Vega 140 CID [2.3 liters], 2V --- to determine fuel consumption and emissions
[PB-281774/0] N78-33455
Performance characteristics of automotive engines in the United States. Second series, report no. 2: 1976 Chevrolet 305 CID [5.0 liters], 2V --- to determine fuel consumption and emissions
[PB-281775/7] N78-33456
Performance characteristics of automotive engines in the United States. Second series, report no. 3: 1977 Chrysler 225 CID [3.7 liters], 2V --- to determine fuel consumption and emissions
[PB-281776/5] N78-33457
Performance characteristics of automotive engines in the United States. First series, report no. 12: 1975 Perkins diesel 247 CID [4.0 liters], FI --- to determine fuel consumption and emissions
[PB-281777/3] N78-33458

Performance characteristics of automotive engines in the United States. First series, report no. 13: 1975 American Motors, 258 CID (4.2 liters), 1V --- to determine fuel consumption and emissions
[PB-281778/1] N78-33459
Study of heat engine/flywheel: Hybrid propulsion configuration with electrical transmission system, phase I
[ALO-41/1] N78-33560
Passenger car fuel economy in short trip operation
[COO-4248-1] N78-33592
Fuel consumption: Transportation, volume 1. A bibliography with abstracts
[NTIS/PS-78/0707/6] N78-33599
Fuel consumption: Transportation, volume 2. A bibliography with abstracts
[NTIS/PS-78/0708/4] N78-33600
Fuel consumption: Industrial, residential, and general studies. Volume 1. A bibliography with abstracts
[NTIS/PS-78/0709/2] N78-33601
Fuel consumption: Industrial, residential, and general studies. Volume 2. A bibliography with abstracts
[NTIS/PS-78/0710/0] N78-33602

FUEL INJECTION
Evaluation of FIDC system --- fuel vapor injector/igniter and lean limit controller for automobile engines
[NASA-CR-157763] N78-34007

FUELS
Department of Energy position paper on alcohol fuels
[DOE/US-0001/1] N78-33256
Fuels from sugar crops
[TID-28191] N78-33259
Alcohol fuels. Citations from the NTIS data base
[NTIS/PS-78/0673/0] N78-33262
Alcohol fuels. Citations from the engineering index data base
[NTIS/PS-78/0674/8] N78-33263

FUNCTIONAL ANALYSIS
Information theoretic methods for indicating the speed of convergence and approximation accuracy of distributions
N78-33845
Functional relationship of angular aberrations for systems with inhomogeneous media
N78-34031

FUNCTIONS [MATHEMATICS]
A mathematical structure
N78-33824
An extension of Newton's method to systems of equations and inequalities
N78-33832

FUSELAGES
Primary Adhesively Bonded Structure Technology (PABST). Phase 1: Detail design
[AD-A056857] N78-33095

FUSION REACTORS
A toroidal fusion reactor design based on the reversed-field pinch
N78-33926

G

GALACTIC RADIATION
Observability of the neutrino flux from the inner region of the galactic disk
[NASA-TM-79658] N78-34026

GALACTIC STRUCTURE
The dynamical halo and the variation of cosmic-ray path length with energy
[NASA-TM-79647] N78-34027

GALERKIN METHOD
An investigation of the orthogonal collocation method with applications to some structural mechanics problems
N78-33476

GALLIUM ARSENIDES
Current voltage characteristics of gallium-arsenide metal epitaxial semiconductor field effect transistors at cryogenic temperatures
N78-33337
Cost effective GaAs Read IMPATT transmitters
[AD-A056996] N78-33352

GALLIUM COMPOUNDS
Growth and characterization of semi-insulating GaN thin films
N78-33954

GAME THEORY
Performance analysis of the Technology Chess Program
[AD-A056072] N78-33868

GAMMA RAYS
Manual for the application of NURE 1974-1977 aerial gamma-ray spectrometer data
[GJBX-13-78] N78-33519
Energy spectra of double-scattered photons
N78-33904

GAS ANALYSIS
An investigation of the gaseous character of the atmosphere at the high energy laser test facility HELSTF at the White Sands Missile range [WSMR]
[AD-A056378] N78-33429
Spectrophone analysis of gas samples obtained at field site
[AD-A057202] N78-33621

GAS CHROMATOGRAPHY
Pulsed positive negative ion chemical ionization mass spectrometry
N78-33156
New techniques for the analysis of thermolysis products
N78-33163

GAS COOLING
A perturbation analysis of the steady integral flow and heat transport of gases in rod bundles, Part 1: Asymptotic analysis of plane turbulent Couette-Poiseuille flows, Part 2
N78-33372

GAS DETECTORS
Microprobe method for studying gas-liquid oxygen transfer in various surfactant systems
N78-33160

GAS DYNAMICS
A study on thermoplastic structural foam --- dynamics of gas bubbles
N78-33229
Optical measurement methods in thermogasdynamics
[NASA-TM-75333] N78-33915

GAS EXPANSION
Escape of gases from planetary atmospheres
N78-34018

GAS FLOW
Formation of iron carbonyl between a 1/2% Mo steel and high-pressure gases containing carbon monoxide
[ORNL-5410] N78-33215
Effects of excess charge density on dielectric breakdown
N78-33325

GAS GENERATORS
Development of a high acceleration gas generation system
[AD-A056751] N78-33250

GAS INJECTION
Evaluation of FIDC system --- fuel vapor injector/igniter and lean limit controller for automobile engines
[NASA-CR-157763] N78-34007

GAS LASERS
Characteristics of amplified spontaneous emissions in high-gain gas-laser amplifiers
N78-33419
Lightweight laser mirror structural studies
[Y-DA-7472] N78-33437

GAS MASERS
Study of improvement of hydrogen maser frequency standard
[NASA-CR-156836] N78-33425

GAS MIXTURES
Electron beam pumped vapor phase dye lasers
N78-33423

GAS PIPES
Land use planning issues and the Alaska gas pipeline: A report to the President
[PB-281327/7] N78-33522

GAS RECOVERY
Environmental Development Plan [EDP]. Enhanced gas recovery, FY 1977
[DOE/EDP-23] N78-33518

GAS TRANSPORT
A perturbation analysis of the steady integral flow and heat transport of gases in rod bundles, Part 1: Asymptotic analysis of plane turbulent Couette-Poiseuille flows, Part 2
N78-33372

GAS TUNGSTEN ARC WELDING
Inert gas welding, volume 2. Citations from the engineering index data base
[NTIS/PS-78/0904-VOL-2] N78-33460
Inert gas welding, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0905/6] N78-33461
Inert gas welding. Citations from the NTIS data base
[NTIS/PS-78/0903/1] N78-33462

GAS TURBINE ENGINES
Redundant disc
[NASA-CASE-LEW-12496-1] N78-33101
Ceramics technology readiness development program. Phase 1: Conceptual designs and material screening --- erosion/corrosion resistance
[FE-2786-12] N78-33243

GAS TURBINES
Solar-thermal conversion to electricity utilizing a central receiver, open-cycle gas turbine design
[EPRI-ER-652] N78-33587

GAS VALVES
Analysis of a high speed ring valve system for a single cylinder reciprocating compressor
N78-33442

GAS WELDING
Inert gas welding, volume 2. Citations from the engineering index data base
[NTIS/PS-78/0904-VOL-2] N78-33460
Inert gas welding, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0905/6] N78-33461
Inert gas welding. Citations from the NTIS data base
[NTIS/PS-78/0903/1] N78-33462

GAS-LIQUID INTERACTIONS
Microprobe method for studying gas-liquid oxygen transfer in various surfactant systems
N78-33160

GAS-METAL INTERACTIONS
A model calculation for the interaction of hydrogen with transition metals: H in Ni
N78-33193

GASOLINE
Conversion of cellulosic and waste polymer material to gasoline
[COO-2982-21] N78-33257
Performance of gasoline and diesel fuels produced from COED syncrude
[BERC/RI-78/2] N78-33261

GATES [CIRCUITS]
The design of multivalued logic gates and fault detection in multivalued logic networks
N78-33750

GEARS
Rolling element fatigue testing of gear materials
[NASA-CR-135450] N78-33463

GENERAL AVIATION AIRCRAFT
Annual review of aircraft accident data, US general aviation, calendar year 1976
[PB-281330/1] N78-33064
Fuel consumption: Transportation, volume 1. A bibliography with abstracts
[NTIS/PS-78/0707/6] N78-33599
Fuel consumption: Transportation, volume 2. A bibliography with abstracts
[NTIS/PS-78/0708/4] N78-33600

GEOCHEMISTRY
NURE geochemical investigations in the eastern United States
[DP-MS-77-101] N78-33517
Geothermal energy. Part 1: Exploration, volume 3. Citations from NTIS data base
[NTIS/PS-78/0664/9] N78-33881

GEODETIC COORDINATES
Determining crustal strain rates with a spaceborne geodynamics ranging system. 2: Station coordinate analysis
[NASA-TM-79627] N78-33647

GEODETIC SURVEYS
TRAV10 horizontal network adjustment program
[PB-283087/5] N78-33668

GEOLOGICAL FAULTS
A study of the Tyrone-Mount Union lineament by remote sensing techniques and field methods
[E78-10155] N78-33505

GEOLOGICAL SURVEYS
Discrimination of rock classes and alteration products in southwestern Saudi Arabia with computer-enhanced LANDSAT data
[NASA-TP-1327] N78-33499
Manual for the application of NURE 1974-1977 aerial gamma-ray spectrometer data
[GJBX-13-78] N78-33519
Geology of the northern Sierra Nevada basement rocks, Quincy-Downieville area, California
N78-33640
The petrology of two late pliocene bentonites and the enclosing rocks, upper Siwalik Subgroup, northern Punjab and southwestern Kashmir, Pakistan
N78-33641
Preliminary geologic evaluation of L-band radar imagery: Arkansas test site
[NASA-CR-157761] N78-33644
Table of field numbers, localities, and descriptions of source materials for monazite-bearing concentrates from the Southeastern Atlantic States
[PB-281684/1] N78-33669
Geothermal energy. Part 1: Exploration, volume 3. Citations from NTIS data base
[NTIS/PS-78/0664/9] N78-33881

GEOMETRY
Representations in the PADL-1.0/n processor: Simple geometric entities
[PB-281551/2] N78-33759

GEOPHYSICS
Geothermal energy. Part 1: Exploration, volume 3. Citations from NTIS data base
[NTIS/PS-78/0664/9] N78-33881

GEORGIA
Solar total-energy large-scale experiment at Shenandoah, Georgia
[SAND-77-2075C] N78-33561

GEOS 3 SATELLITE
GEOS-3 ocean current investigation using radar altimeter profiling --- Gulf Stream surface topography
[NASA-TM-73280] N78-33696

GEOTHERMAL ENERGY CONVERSION
Engineering and economic feasibility of utilizing geothermal heat from the Heber reservoir for industrial processing purposes at Valley Nitrogen Producers Inc., El Centro agricultural chemical plant
[SAN-1323-3] N78-33562
Residential space heating cost: Geothermal vs conventional systems
[TREE-1182] N78-33567
Thermal drawdown and recovery of singly and multiply fractured hot dry rock reservoirs
[LA-7219-MS] N78-33572
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0665/6] N78-33882
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0666/4] N78-33883
Geothermal energy, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0667/2] N78-33884

GEOTHERMAL RESOURCES
Evaluation of geothermal energy exploration and resource assessment, volume 1: A review of geothermal subsidence modeling
[SAN-1269-1-VOL-1] N78-33515
Sensor applications study. Technical report, task 1
[TID-27941] N78-33516
Engineering and economic feasibility of utilizing geothermal heat from the Heber reservoir for industrial processing purposes at Valley Nitrogen Producers Inc., El Centro agricultural chemical plant
[SAN-1323-3] N78-33562
Geothermal well completions: An overview of existing methods in four types of developments
[SAND-78-7010] N78-33580
Survey of environmental regulations applying to geothermal exploration, development, and use
[PB-281023/2] N78-33672
Geothermal energy. Part 1: Exploration, volume 3. Citations from NTIS data base
[NTIS/PS-78/0664/9] N78-33881
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0665/6] N78-33882
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0666/4] N78-33883
Geothermal energy, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0667/2] N78-33884

GEYSERS
Geothermal well completions: An overview of existing methods in four types of developments
[SAND-78-7010] N78-33580

GLASS
Phonon thermal transport metallic glasses below 100 K
[COO-1198-1205] N78-33239

GLASS COATINGS
Effect of silicon carbide on devitrification of a glass coating for reusable surface insulation
[NASA-TM-78755] N78-33230

GLINT
Further studies of sunlight glitter on a wind-ruffled sea --- oil slicks
[AD-A056850] N78-33917

GLOBAL POSITIONING SYSTEM
Independent stability and control analysis of navigation development satellites for the global positioning system. Volume 1: Technical report
[AD-A056811] N78-33081
, Independent stability and control analysis of navigation development satellites for the global positioning system. Volume 2: Appendixes
[AD-A056812] N78-33082

GONADS
Compilation and assessment of microwave bioeffects, AO-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system
[PNL-2634] N78-33720

GOVERNMENT PROCUREMENT
Computer-aided environmental impact analysis for industrial, procurement, and research Development, test, and evaluation activities: User's manual
[AD-A056997] N78-33620
Passing the threshold into the information age: Perspective for federal action on information. Volume 1: Basic findings report
[PB-281720/3] N78-33991
Passing the threshold into the information age: Perspective for federal action on information. Volume 2: Research report
[PB-281721/1] N78-33992

GOVERNMENTS
Canada in space
N78-33126
Cooperative research and development and associated government policy
N78-33976
Legislatures and information systems. An overview and analysis of recent experience --- using computers for policy making in state government
[PB-282050/4] N78-33993
Legislatures and information systems: Challenges and responses in the states
[PB-282051/2] N78-33994
Agencies, implementation of and compliance with the Privacy Act can be improved
[PB-281768/2] N78-33997

GRADIENTS
Magnetic bubble domain wall dyanmics in gradient translation
N78-33334

GRANULAR MATERIALS
A distribution model for the aerial application of granular agricultural particles
[NASA-CR-157745] N78-33048

GRAPH THEORY
Input-output stability theory of interconnected systems
N78-33807
The zonal matching problem
N78-33867

GRAPHITE
Development of graphite/polyimide honeycomb core materials
[NASA-CR-158921] N78-33148
Electrical conductivity of selected graphite intercalation compounds in the temperature range between 4 and 300 Kelvin degrees
[AD-A056429] N78-33350
Analysis of graphite/polyimide rail shear specimens subjected to mechanical and thermal loading
[NASA-CR-157769] N78-33481

GRAPHITE-EPOXY COMPOSITE MATERIALS
Impact tests on fibrous composite sandwich structures
[NASA-TM-78719] N78-33152
Moisture diffusion in fiber reinforced composites --- graphite-epoxy composites
[AD-A056557] N78-33154
Galvanic corrosion fatigue testing of 7075-T6 aluminum bonded with graphite-epoxy composite
[AD-A055714] N78-33197

GRAVITATIONAL EFFECTS
Deposition of suspensions in laminar flow in the entrance region of channels with diffusive, electrostatic and gravitational effects
N78-33369

GRAVITY ANOMALIES
Application of inversion theory to new satellite systems for determination of the gravity field
[AD-A057188] N78-33666

GREAT BASIN [US]
Nitrate and phosphorus runoff losses from small watersheds in Great Lakes Basin
[PB-281275/8] N78-33633

GREAT PLAINS CORRIDOR [NORTH AMERICA]
Dynamical model of gust front
[PB-283425/7] N78-33692

GROUND STATE
Extended fine structure above vanadium L-shell appearance potential thresholds
[AD-A057141] N78-33203
Report of progress in the development of an electron impact ionization model
[AD-A056363] N78-33907

GROUND STATIONS
Determining crustal strain rates with a spaceborne geodynamics ranging system. 2: Station coordinate analysis
[NASA-TM-79627] N78-33647

GROUND WAVE PROPAGATION
Groundwave propagation and radiation patterns of a vertical electric dipole over a radially varying surface impedance plane
N78-33282

GULF OF MEXICO
Light hydrocarbons in marine sediments --- Texas-Louisiana coastal shelve region
N78-33614

GULF STREAM
GEOS-3 ocean current investigation using radar altimeter profiling --- Gulf Stream surface topography
[NASA-TM-73280] N78-33696
Gulfstream: Monthly publications, January - December 1977. Volume 3, nos. 1 - 12
[PB-283177/4] N78-33698
Gulf Stream. A bibliography with abstracts
[NTIS/PS-78/0844/7] N78-33700

GUST LOADS
Dynamical model of gust front
[PB-283425/7] N78-33692

H

HALF LIFE
Nuclear lifetimes in manganese-52
N78-33905

HALOS
The dynamical halo and the variation of cosmic-ray path length with energy
[NASA-TM-79647] N78-34027

HANDICAPS
San Diego wheelchair accessible bus study
[PB-281087/7] N78-34010

HARDNESS TESTS
Long-term hot-hardness characteristics of five through-hardened bearing steels
[NASA-TP-1341] N78-33196

HARMONIC RADIATION
Spatially, and temporally resolved harmonic emission studies of laser produced plasmas
N78-33928

HAWAII
OTEC thermal resource report for Hawaii
[TID-27950] N78-33573

HEAD-UP DISPLAYS
Human factors engineering for head-up displays: A review of military specifications and recommendations for research
[AD-A056944] N78-33099

HEALTH PHYSICS
Advances in human internal radiation counting at Los Alamos: Multiple simultaneous in-vivo measurements
[LA-UR-78-1063] N78-33721

HEAO
Second high energy astronomy observatory launch set
[NASA-NEWS-RELEASE-78-165] N78-33130

HEAT
Heat pulse propagation characteristics in N-type In As
[AD-A057243] N78-33970

HEAT EXCHANGERS
Coal fired prototype high temperature continuous flow heat exchanger. AF-684 research project 545-1
[EPRI-AF-684] N78-33391
Viscous entrainment of mass and energy in fluid dynamic energy separation
[PB-281759/1] N78-33401
Solar heat transport fluid
[NASA-CR-150806] N78-33530

HEAT PIPES
Sodium vapor heat pipe laser cell
[LA-UR-78-532] N78-33392
Performance investigations of liquid-metal heat pipes for space and terrestrial applications
[LA-UR-78-547] N78-33396

HEAT PUMPS
Phoenix House: Solar-assisted heat pump system evaluation
[EPRI-ER-712] N78-33574

HEAT RESISTANT ALLOYS
Evaluation of cyclic behavior of aircraft turbine disk alloys
[NASA-CR-159433] N78-33478

HEAT STORAGE
Applications of thermal energy storage in the cement industry
[NASA-CR-159399] N78-33537
Compressed air energy storage advanced systems analysis
[PNL-2464] N78-33545
Environmental Development Plan [EDP]: Solar agricultural and industrial process heat, 1977
[DOE/EDP-0002] N78-33568
Investigation of alternate types of water-storage components to be utilized in conjunction with the ACES system
[ORNL/SUB-78/14233/1] N78-33578

HEAT TRANSFER
Thermal characteristics of the 12-gigahertz, 200-watt output stage tube for the communications technology satellite
[NASA-TP-1344] N78-33137
A theoretical study on oxidative catalytic monoliths --- carbon monoxide oxidation and mass and heat transport
N78-33158
Measurement of the thermal conductivity of liquids
[PB-281706/2] N78-33183
A perturbation analysis of the steady integral flow and heat transport of gases in rod bundles, Part 1: Asymptotic analysis of plane turbulent Couette-Poiseuille flows, Part 2
N78-33372
Performance investigations of liquid-metal heat pipes for space and terrestrial applications
[LA-UR-78-547] N78-33396
Analysis of heat transfer in horizontal tube falling film evaporators
[ANL-OTEC-78-1] N78-33399
Creation of lumped parameter thermal model by the use of finite elements
[NASA-CR-158944] N78-33479
Use of microwave energy in conjunction with fluidized bed reactors
[CONF-771125-3] N78-33588

HEAT TRANSMISSION
Thermal drawdown and recovery of singly and multiply fractured hot dry rock reservoirs
[LA-7219-MS] N78-33572

HEAT TREATMENT
Studies of microstructure-property relationships in austenitic stainless steels
[ORO-4044-7] N78-33218
Thermal conversion of oil-shale kerogen using CO and water at elevated pressures
[LERC-78/1] N78-33552

HEATING
Measuring and predicting the dynamic effects of a confined thin metal plate pulse heated into the liquid-vapor regime
N78-33192
Extended development of variable conductance heat pipes
[NASA-CR-152183] N78-33379
Modulated electron beam heating of a contact ionized lithium plasma in a mirror machine
N78-33924

HEATING EQUIPMENT
Development of flat-plate solar collectors for the heating and cooling of buildings: Executive summary
[NASA-CR-134804] N78-33527
Economic feasibility of strontium-90 fueled heaters for use in cold regions
[PNL-2476] N78-33546
Residential space heating cost: Geothermal vs conventional systems
[TREE-1182] N78-33567

HEAVY ELEMENTS
Overview: History and perspective of the search for superheavy elements
[CONF-780333-2] N78-33898

HEAVY IONS
Overview: History and perspective of the search for superheavy elements
[CONF-780333-2] N78-33898

HEAVY LIFT HELICOPTERS
Design and development of helicopter external cargo sling legs made with Kevlar
[AD-A056951] N78-33093

HEAVY WATER
An experimental investigation of the critical supersaturation of five vapors in a shock tube --- Freon benzene, carbon tetrachloride, water and heavy water
[AD-A056859] N78-33172

HEISENBERG THEORY
Investigations of resonance fluorescence --- quantum electrodynamics and Heisenberg theory
N78-33892

HELICAL ANTENNAS
An investigation of the possible uses of the normal mode helical antenna in the tactical army
[AD-A056324] N78-33314

HELICOPTER DESIGN
Theoretical study of multicyclic control of a controllable twist rotor
[NASA-CR-151959] N78-33085

HELICOPTERS
Visual performance/workload of helicopter pilots during instrument flight
[AD-A055424] N78-33738

HELIOSTATS
Heliostat systems design and operation. Citations from the engineering index data base
[NTIS/PS-78/0842/1] N78-33608

HELIUM
Interactions of atoms with solid surface: Nonadiabatic mechanism for the production of excited state hydrogen and helium atoms at a metal surface
N78-33889
Theoretical study of the differential positronium cross section with helium and argon targets
N78-33893
Proposed rocket experiments to measure the profile and intensity of the solar He1584A resonance line
[NASA-CR-156779] N78-34023

HELIUM ATOMS
Experimental study of resonant electron transfer in He [+] [+] He and H [+] [+]H collisions at low relative velocities
N78-33888

HELIUM ISOTOPES
The specific heat of helium four near the superfluid transition in a confined geometry
N78-33966

HELMETS
Program documentation for the terrain and flight dynamics program --- computer graphics for flight simulation
[AD-A056116] N78-33742

HELMHOLTZ EQUATIONS
Four FORTRAN programs for numerically solving Helmholtz's equation in an arbitrary bounded planar region
[LBL-7516] N78-33798
A finite element method for problems involving the Helmholtz equation in two dimensional exterior regions
N78-33823

HEMATOLOGY
Biological effects of high strength electric fields on small laboratory animals
[HCP/T1830-03] N78-33706

HEMODYNAMIC RESPONSES
Relationship between osmotic pressure of the blood and secretion of sweat
[NASA-TM-75461] N78-33703

HEPTANES
Degradation studies of a trimethylolpropane triheptanoate lubricant basestock
[AD-A056825] N78-33237

HERMETIC SEALS
Sealed primary lithium-inorganic electrolyte cell
[AD-A056370] N78-33543

HIERARCHIES
Hierarchical analysis of systems
N78-33865

HIGH ENERGY INTERACTIONS
Second high energy astronomy observatory launch set
[NASA-NEWS-RELEASE-78-165] N78-33130

HIGH FREQUENCIES
Prototype High Frequency [HF] intercept capability for the tactical airbase weather element [TABWE]
[AD-A055685] N78-33292
Performance evaluation of simple HF antenna systems
[AD-A057255] N78-33310
High frequency behavior of source excited concave surfaces
N78-33475

HIGH GAIN
Characteristics of amplified spontaneous emissions in high-gain gas-laser amplifiers
N78-33419

HIGH PRESSURE
Luminescent decay and spectra of impurity-activated alkali halides under high pressure
[COO-1198-1191] N78-33173
Hyperbaric oxygenation. A bibliography with abstracts
[NTIS/PS-78/0676/3] N78-33724
Review of instability theory for high pressure Tokamak plasma
[ORNL/TR-4610] N78-33939

HIGH SPEED
High-speed lookup table technique for digital multiplication
[SAND-77-1866] N78-33840

HIGH TEMPERATURE
High temperature cyclic deformation in nickel TD-nickel, and Al-4 percent Cu alloy aged to contain theta prime and theta double prime
N78-33190
High temperature properties and processes in ceramics: Thermomigration
[COO-2923-02] N78-33241
Active devices for high temperature microcircuitry
[SAND-77-1145] N78-33414

HIGH TEMPERATURE TESTS
High temperature, noncontact material testing --- ultrasonic tests of elastic materials using pulsed lasers
[UCRL-80438] N78-33212

HIGHWAYS
National highway inventory and performance summary-from the 1976 national highway inventory and performance study
[PB-281101/6] N78-34009

HOLDERS
Plural output optimetric sample cell and analysis system
[NASA-CASE-NPO-10233-1] N78-33913

HOLE DISTRIBUTION [ELECTRONICS]
Radio frequency size effect measurements on the Fermi surface of rhenium
N78-33962

HOLOGRAPHIC INTERFEROMETRY
Pulsed holographic analysis of large vibrating vehicle components
[AD-A056439] N78-33410

HOLOGRAPHY
Nondestructive evaluation techniques for high-temperature ceramic components
[ANL/MSD-78-5] N78-33240
Multiple cavity laser holographic system
[SAND-78-0496] N78-33417

HONEYCOMB CORES
Development of graphite/polyimide honeycomb core materials
[NASA-CR-158921] N78-33148

HONEYCOMB STRUCTURES
Development of graphite/polyimide honeycomb core materials
[NASA-CR-158921] N78-33148

HOWITZERS
Investigation into the effects of weapon setback on various materials and geometries
[AD-A057236] N78-33450

HUMAN BEINGS
Quantitative predictions of length in the Mueller-Lyer illusion as perceived by the human visual system
[AD-A055706] N78-33732

HUMAN BODY
Fast neutron depth dose distributions in a heterogeneous phantom
N78-33712
The combined effect of an SHF field and an unfavorable microclimate on the body
N78-33730

HUMAN FACTORS ENGINEERING
Human factors engineering for head-up displays: A review of military specifications and recommendations for research
[AD-A056944] N78-33099
Development of a symbology exerciser for display generation and analysis on the visually-coupled airborne systems simulator [VCASS]
[AD-A055464] N78-33124
Anthropometry: Basic studies and applications, volume 2. A bibliography with abstracts
[NTIS/PS-78/0866/0] N78-33726
Adaptation of time line analysis program to single pilot instrument flight research
[NASA-TM-78748] N78-33731
Effects of platform motion, visual and G-seat factors upon experienced pilot performance, in the flight simulator
[AD-A055691] N78-33739
Design, analysis, and interpretation of screening studies for human factors engineering research, revision
[AD-A056985] N78-33743

HUMAN PERFORMANCE
Environmental noise: The effects of information overload and control over the work environment on performance during and after exposure
N78-33612
Effects of platform motion, visual and G-seat factors upon experienced pilot performance, in the flight simulator
[AD-A055691] N78-33739

HUMAN REACTIONS
Commercial airport operations and community noise criteria
[AD-A057451] N78-33615
The interaction between the utricles and the semicircular canals during eccentric rotation
N78-33714

HUMAN RESOURCES
ERDA facilities: A national resource for resolving energy problems
[ERDA-77-80] N78-33597

HUMAN TOLERANCES
Advances in human internal radiation counting at Los Alamos: Multiple simultaneous in-vivo measurements
[LA-UR-78-1063] N78-33721
Effects of nitrogen dioxide on pulmonary function in human subjects
[PB-281186/7] N78-33723

HUMIDITY
The accelerating nature of electrical bias on moisture induced failures of MOS/LSI devices
N78-33336

HUMIDITY MEASUREMENT
Low-layer features of two limited-area hurricane regimes
[PB-283079/2] N78-33690

HURRICANES
National hurricane operations plan
[PB-282838/2] N78-33689
Low-layer features of two limited-area hurricane regimes
[PB-283079/2] N78-33690

HYBRID STRUCTURES
Analysis/design of strip reinforced random composites [strip hybrids]
[NASA-TM-78985] N78-33149

HYDRATES
Nuclear magnetic resonance relaxation in aqueous protein systems --- cross relaxation and relaxation time
N78-33155

HYDRAULICS
Hydraulic research in the United States and Canada
[PB-281501/7] N78-33400

HYDRIDES
Hydridocyclophosphazenes: Synthesis via organocopper reagents
[AD-A056094] N78-33168

HYDROCARBON COMBUSTION
Inventory of combustion-related emissions from stationary sources
[PB-282428/2] N78-33638

HYDROCARBONS
Detailed models of hydrocarbon combustion
[UCRL-80896] N78-33177
Light hydrocarbons in marine sediments --- Texas-Louisiana coastal shelve region
N78-33614

HYDRODYNAMICS
Hydraulic research in the United States and Canada
[PB-281501/7] N78-33400
Drag reducing fluids. A bibliography with abstracts
[NTIS/PS-78/0730/8] N78-33402

HYDROGEN
Liquids from CO and H2 for energy storage
[EPRI-AF-689] N78-33175
A model calculation for the interaction of hydrogen with transition metals: H in Ni
N78-33193
Temperature dependence of hydrogen sputtering of carbon coatings on platinum
[GA-A-14608] N78-33221
Reversible metal hybride-air fuel cell
[AD-A056591] N78-33540

Interactions of atoms with solid surface: Nonadiabatic mechanism for the production of excited state hydrogen and helium atoms at a metal surface
N78-33889
AB initio LCAO/MO cluster-type calculation of the self consistent electronic screening charge density around a single hydrogen impurity in a nickel crystal
N78-33963

HYDROGEN ATOMS
Parity nonconservation in the hydrogen atom
N78-33887
Experimental study of resonant electron transfer in He [+] [+] He and H [+] [+]H collisions at low relative velocities
N78-33888

HYDROGEN ENGINES
Hydrogen-fueled engine
[NASA-CASE-NPO-13763-1] N78-33526

HYDROGEN ISOTOPES
Thermodynamic and transport properties of interstitial hydrogen isotopes in metal systems
[COO-3551-44] N78-33224

HYDROGEN PRODUCTION
Photoproduction of hydrogen by marine blue-green algae
[PB-280995/2] N78-33264

HYDROGEOLOGY
NURE geochemical investigations in the eastern United States
[DP-MS-77-101] N78-33517

HYDROLOGY
Radar target remotely sensing hydrological phenomena
[NASA-CASE-LAR-12344-1] N78-33511
Remote sensing applied to hydrology. A bibliography with abstracts
[NTIS/PS-78/0792/8] N78-33523

HYDROMETEOROLOGY
A plan for the collection and transmission of hydrometeorological data in the Brasilian Amazon basin
[E78-10175] N78-33508

HYDROSTATIC PRESSURE
Effect of hydrostatic pressure on the deformation behavior of polyethylene and polycarbonate in tension and in compression
[AD-A056786] N78-33236

HYDROTHERMAL CRYSTAL GROWTH
The hydrothermal synthesis and crystal growth of hydroxyphosphates
N78-33947

HYDROXYL COMPOUNDS
Separation of metal ions using an o-hydroxypropiophenoxime resin
[IS-T-801] N78-33178
The hydrothermal synthesis and crystal growth of hydroxyphosphates
N78-33947

HYPERBOLIC DIFFERENTIAL EQUATIONS
An old integration scheme for compressible flows revisited, refurbished and put to work
[NASA-CR-15775] N78-33382

HYPERGEOMETRIC FUNCTIONS
A geometrical view of the Kolmogorov-Smirnov statistics with multi-sample generalizations
N78-33855

HYPEROXIA
Hyperbaric oxygenation. A bibliography with abstracts
[NTIS/PS-78/0676/3] N78-33724

HYPERTENSION
An estimation procedure for the 3-parameter Weibull distribution in modeling hypertension data
N78-33854

HYSTERESIS
Hysteresis in human binocular fusion: A second look
N78-33711

I

ICE
Study of ice growth in slightly undercooled water
N78-33871

ICE FORMATION
An assessment of synoptic criteria for ice multiplication in convective clouds
[PB-281079/4] N78-33684

IGNITERS
Evaluation of FIDC system --- fuel vapor injector/igniter and lean limit controller for automobile engines
[NASA-CR-157763] N78-34007

IGNITION
Effects of ignition sources and fire retardants on material ignition
[PB-281451/5] N78-33184

ILLUMINANCE
The effects of changes in flare in intensity on the recognition probability of vehicular size targets
[AD-A057238] N78-33253

ILLUMINATING
Illumination requirements for target recognition and reacquisition as a function of field of view --- visual tasks
[AD-A057235] N78-33252

ILLUSIONS
Quantitative predictions of length in the Mueller-Lyer illusion as perceived by the human visual system
[AD-A055706] N78-33732

IMAGE PROCESSING
Instrumentation development of Raster scanning densitometer
[AD-A056968] N78-33309
Change detection and analysis in multi-spectral images
N78-33746
The ARGOS image understanding system
N78-33770
Algorithms and hardware technology for image recognition
[AD-A057191] N78-33821

IMAGE RESOLUTION
Spatially, and temporally resolved harmonic emission studies of laser produced plasmas
N78-33928

IMAGING TECHNIQUES
Detection and location of reseaux using pictorial pattern recognition
N78-33502
Ecosystem mapping by interpretation of landscapes from satellite imagery
N78-33503
Application of an array processor in satellite image processing
[AD-A056664] N78-33755
An analog FFT beamformer for acoustic applications
[AD-A057057] N78-33879
Charge-coupled scanned IR imaging sensors
[AD-A057115] N78-33916

IMPACT TESTS
Impact tests on fibrous composite sandwich structures
[NASA-TM-78719] N78-33152
Classification testing of composition A5 and selected pyrotechnics
[NASA-CR-157744] N78-33251
Studies of impact-induced responses of a generic crushable-rigid rodlike missile against rigid and deformable targets
[ASRL-TR-190-1] N78-33454

IMPEDANCE MEASUREMENTS
Application of impedance tube technique in the measurement of burning solid propellant admittances
N78-33248
Impedance measurement using a two-microphone, random-excitation method
[NASA-TM-78785] N78-33875

IMPEDANCE PROBES
Application of impedance tube technique in the measurement of burning solid propellant admittances
N78-33248

IMPURITIES
Analysis of impurities in composition B by thin layer chromatography
[AD-A056313] N78-33255
AB initio LCAO/MO cluster-type calculation of the self consistent electronic screening charge density around a single hydrogen impurity in a nickel crystal
N78-33963

IN-FLIGHT MONITORING
ATS-6 flight accelerometers --- in-flight monitoring of spacecraft dynamic response
[NASA-TM-79847] N78-33096

INCENTIVE TECHNIQUES
Analysis of federal incentives used to stimulate energy production: An executive summary
[PNL-2410] N78-33565
Cooperative research and development and associated government policy
N78-33976

INCOMPRESSIBLE FLOW
NACHOS: A finite element computer program for incompressible flow problems. Part 1: Theoretical background
[SAND-77-1333-PT-1] N78-33395

INCONEL [TRADEMARK]
Compilation of fatigue data for Incoloy 800 alloys
[ANL/MSD-78-3] N78-33217

INDENTATION
Impression creep of LiF and Cu-Ni single crystals
N78-33956

INDEPENDENT VARIABLES
Creation of lumped parameter thermal model by the use of finite elements
[NASA-CR-158944] N78-33479
A parameter estimation subroutine package
[NASA-CR-157766] N78-33789
Adaptive stochastic control of linear systems with random parameters
[AD-A056849] N78-33822
Large deviations for diffusions depending on small parameters: A stochastic control method
[AD-A055652] N78-33860

INDEXES [DOCUMENTATION]
National Computer Center personnel management information system design requirements specification. Volume 2: Report index and formats
[PB-282590/9] N78-33982

INDEXES [RATIOS]
Rapid techniques for calculating the Pollution Standards Index [PSI]
[PB-282028/0] N78-33635

INDIUM COMPOUNDS
Heat pulse propagation characteristics in N-type In As
[AD-A057243] N78-33970

INDUCTANCE
Excitation of current on an infinite horizontal wire over the earth by an arbitrary electric dipole source
[AD-A057257] N78-33346

INDUSTRIAL ENERGY
Applications of thermal energy storage in the cement industry
[NASA-CR-159399] N78-33537
Voluntary business energy conservation program
[DOE/CS-0018/6] N78-33548
Potential for cogeneration development in six major industries by 1985
[HCP/M60172-01/2] N78-33551
Environmental Development Plan [EDP]: Solar agricultural and industrial process heat, 1977
[DOE/EDP-0002] N78-33568
Research on the application of solar energy to industrial drying or dehydration processes
[ORO-5123-1] N78-33583
Energy efficiency and electric motors
[HCP/M50217-01] N78-33591
Biomass energy success stories: A portfolio illustrating current economic uses of renewable biomass energy
[HCP/T0285-02] N78-33598
Assessment of the role of advanced technologies in small utilities
[EPRI-EM-696-VOL-2] N78-34008

INDUSTRIAL MANAGEMENT
Computer-aided environmental impact analysis for industrial, procurement, and research Development, test, and evaluation activities: User's manual
[AD-A056997] N78-33620

INDUSTRIAL PLANTS
Solar total energy system: Large scale experiment. Phase 2: Conceptual design
[SE-3986-1] N78-33566
Fuel consumption: Industrial, residential, and general studies. Volume 1. A bibliography with abstracts
[NTIS/PS-78/0709/2] N78-33601
Fuel consumption: Industrial, residential, and general studies. Volume 2. A bibliography with abstracts
[NTIS/PS-78/0710/0] N78-33602

INDUSTRIAL WASTES
Assessment of industrial hazardous waste practices, rubber and plastics industry: Executive summary
[PB-282070/2] N78-33270
Assessment of industrial hazardous waste practices, rubber and plastics industry: Plastic materials and synthetics industry
[PB-282071/0] N78-33271
Assessment of industrial hazardous waste practices, rubber and plastics industry: Rubber products industry
[PB-282072/8] N78-33272
Assessment of industrial hazardous waste practices, rubber and plastics industry: Appendices
[PB-282073/6] N78-33273
Computer simulation of the visual effects of smoke plumes
[LA-UR-78-689] N78-33625

INELASTIC SCATTERING
The elastic and inelastic scattering of alpha particles by oxygen-16
N78-33906
Lattice dynamics of alpha uranium
N78-33967

INEQUALITIES
An extension of Newton's method to systems of equations and inequalities
N78-33832

INERTIAL NAVIGATION
Continuous Kalman updating of an inertial navigation system using terrain measurements
[SAND-78-0421C] N78-33083

INFLATABLE STRUCTURES
Analysis of conjunctive rocketborne inflatable sphere and bead thermistor soundings
[AD-A056943] N78-33662

INFORMATION DISSEMINATION
An operational message composition system using the NWS Automatic Data Acquisition System [ADAS] computer system
[PB-283088/3] N78-33691

INFORMATION MANAGEMENT
A lower bound to protocol information in data networks
[AD-A056345] N78-33812

Department of energy's consolidation of information processing activities needs more attention
[PB-281269/1] N78-33996
Technology utilization in a non-urban region: Further impact and technique of the Technology Use Center
[NASA-CR-157743] N78-34006
INFORMATION RETRIEVAL
Project RMAG: Symbolic logic retrieval source code
[PB-281373/1] N78-33979
Project RMAG: Symbolic logic retrieval users guide
[PB-281374/9] N78-33980
ESCOE information retrieval system. System description and operation --- information needs of engineers
[FE-2468-26] N78-33985
INFORMATION SYSTEMS
Initial considerations for a nationwide data base
[ISSN-0160-9742] N78-33983
The design and implementation of Instructional Software Information System [ISIS]
[AD-A056323] N78-33984
ESCOE information retrieval system. System description and operation --- information needs of engineers
[FE-2468-26] N78-33985
Systems analysis of scientific and technical communication in the United States: The electronic alternative to communication through paper-based journals
[PB-281847/4] N78-33986
Systems analysis of scientific and technical communication in the United States. Annex 1: Communication functions in science and technology
[PB-281848/2] N78-33987
Systems analysis of scientific and technical communication in the United States: Annex 2: The current practices
[PB-281849/0] N78-33988
Systems analysis of scientific and technical communication in the United States. Annex 3: An electronic alternative
[PB-281850/8] N78-33989
Systems analysis of scientific and technical communication in the United States. Annex 4: The cost model
[PB-281851/6] N78-33990
Passing the threshold into the information age: Perspective for federal action on information. Volume 1: Basic findings report
[PB-281720/3] N78-33991
Passing the threshold into the information age: Perspective for federal action on information. Volume 2: Research report
[PB-281721/1] N78-33992
Legislatures and information systems. An overview and analysis of recent experience --- using computers for policy making in state government
[PB-282050/4] N78-33993
Legislatures and information systems: Challenges and responses in the states
[PB-282051/2] N78-33994
Machine-readable identification system for library materials
[PB-282499/3] N78-33998
The conceptual framework for a comprehensive and continuing STI resource inventory
[PB-282345/8] N78-33999
INFORMATION THEORY
Source and channel coding theory
N78-33767
Information theoretic methods for indicating the speed of convergence and approximation accuracy of distributions
N78-33845
Information theoretic analysis of multiphoton excitation and collisional deactivation in polyatomic molecules
[COO-2793-11] N78-33899
Relations between bit and block error probabilities under Markov dependence
[PB-281545/4] N78-33995
INFRARED DETECTORS
Charge-coupled scanned IR imaging sensors
[AD-A057115] N78-33916
INFRARED LASERS
Anomalous dispersion and the pumping of far infrared [FIR] lasers
[NASA-TM-79596] N78-33424
INFRARED RADIATION
Theoretical study of background radiance in upper atmosphere
[AD-A057249] N78-33663
Remote sounding of cloud compositions from NOAA 4 and Nimbus 6 infrared sounders
[AD-A056852] N78-33683
Infrared upconversion. A bibliography with abstracts
[NTIS/PS-78/0670/6] N78-33922
INFRARED SPECTRA
Infrared spectra of lunar soil analogs --- spectral reflectance of minerals
[NASA-CR-157742] N78-34020
INFRARED SPECTROSCOPY
Spectrophone analysis of gas samples obtained at field site
[AD-A057202] N78-33621
INPUT/OUTPUT ROUTINES
A cost benefit analysis of proposed Federal input/output channel level computer interface standards
[PB-282406/8] N78-33761
Input-output stability theory of interconnected systems
N78-33807
National Computer Center personnel management information system design requirements specification. Volume 1: Design requirements and data dictionary
[PB-282589/1] N78-33981
INSOLATION
On the nature and distribution of solar radiation --- insolation and earth atmosphere effects
[HCP/T2552-01] N78-33667
INSTALLATION MANUALS
Installation package for Sunpak solar collectors
[NASA-CR-150802] N78-33528
INSTALLING
Certification and verification for Calmac flat plate solar collector
[NASA-CR-150784] N78-33532
INSTITUTIONS
Legislatures and information systems. An overview and analysis of recent experience --- using computers for policy making in state government
[PB-282050/4] N78-33993
Legislatures and information systems: Challenges and responses in the states
[PB-282051/2] N78-33994
INSTRUMENT FLIGHT RULES
Adaptation of time line analysis program to single pilot instrument flight research
[NASA-TM-78748] N78-33731
Visual performance/workload of helicopter pilots during instrument flight
[AD-A055424] N78-33738
INSTRUMENT PACKAGES
Center punched solar cell module development effort
[NASA-CR-157760] N78-33536
INTAKE SYSTEMS
Design and overall performance of four highly loaded, high speed inlet stages for an advanced high-pressure-ratio core compressor
[NASA-TP-1337] N78-33108
INTEGRAL TRANSFORMATIONS
An old integration scheme for compressible flows revisited, refurbished and put to work
[NASA-CR-15775] N78-33382
INTEGRATED CIRCUITS
A study of alternatives for VSTOL computer systems
[AD-A056105] N78-33098
Optimized design of low-distortion monolithic wideband amplifiers
N78-33328
Extensions of AHPL and optimization of the AHPL compiler for MSI/LSI design
N78-33333
Integrated injection logic [I2L]. Comparative and design trade-off evaluation
[AD-A056392] N78-33342
IC fabrication using electron-beam technology
[AD-A056717] N78-33343
Computer aided engineering of semiconductor integrated circuits
[AD-A056914] N78-33345
Computer aided design of microcircuits. Citations from the engineering data base
[NTIS/PS-78/0822/3] N78-33361
INTERFERENCE
Terminal radar interference criteria study --- air traffic controller performance
[AD-A057280] N78-33291
INTERFERENCE DRAG
Interference effects on the drag of bluff bodies in tandem
N78-33038
INTERFEROMETERS
Nondestructive evaluation techniques for high-temperature ceramic components
[ANL/MSD-78-5] N78-33240
INTERMODULATION
Relationship between noise figures and other performance characteristics of UHF TV receivers
[PB-281172/7] N78-33318
INTERMOLECULAR FORCES
A mean spherical model for soft potentials: The hard core revealed as a perturbation
[NASA-CR-157771] N78-33381
INTERNAL COMBUSTION ENGINES
Hydrogen-fueled engine
[NASA-CASE-NPO-13763-1] N78-33526
INTERNATIONAL COOPERATION
Canada in space
N78-33126
INTERNATIONAL SUN EARTH EXPLORER 1
Early results from ISEE-A electric field measurements
[NASA-TM-79633] N78-33339
INTERPLANETARY DUST
Are the stratospheric dust particles meteor ablation debris or interplanetary dust?
[NASA-TM-78507] N78-34014
Meteor ablation spheres from deep-sea sediments
[NASA-TM-78510] N78-34021
INTERVALS
A decision theory approach to interval estimation
N78-33856
INTERVERTEBRAL DISKS
The lumbosacral segment as a vulnerable region in various postures
[NASA-TM-75579] N78-33713
INVENTORIES
The conceptual framework for a comprehensive and continuing STI resource inventory
[PB-282345/8] N78-33999
INVENTORY CONTROLS
The multi-product production cycling problem --- determining production and inventory control policies
N78-33864
INVENTORY MANAGEMENT
National highway inventory and performance summary-from the 1976 national highway inventory and performance study
[PB-281101/6] N78-34009
INVERSIONS
Application of inversion theory to new satellite systems for determination of the gravity field
[AD-A057188] N78-33666
INVERTERS
The 15kW general purpose power conditioner [frequency changer]. AC-DC section
[AD-A056302] N78-33353
INVISCID FLOW
A viscous-inviscid interactive compressor calculation
N78-33040
ION ACCELERATORS
Proceedings of the Second International Topical Conference on high Power Electron and Ion Beam Research and Technology, volume 2
[AD-A057219] N78-33897
ION BEAMS
Ion beam sputtering of fluoropolymers --- etching polymer films and target surfaces
[NASA-TM-79000] N78-33151
Proceedings of the Second International Topical Conference on High Power Electron and Ion Beam Research and Technology, volume 1
[AD-A057218] N78-33896
Proceedings of the Second International Topical Conference on high Power Electron and Ion Beam Research and Technology, volume 2
[AD-A057219] N78-33897
ION CHARGE
Pulsed positive negative ion chemical ionization mass spectrometry
N78-33156
Binary positive ion-negative ion mutual neutralization reactions
[AD-A056649] N78-33166
An investigation of radiative lifetimes and oscillator strengths for allowed intra L-shell transitions in multiply-charged chlorine ions
N78-33958
ION CYCLOTRON RADIATION
Nonlinear Landau damping in mirror plasmas
[SAI-78-529-LJ] N78-33941
ION EXCHANGE MEMBRANE ELECTROLYTES
Mass transport and acid-base generation in solution/membrane systems: Extension of Nerast-Planck treatment to electrolytic multicomponent systems
N78-33159
ION EXCHANGE RESINS
Separation of metal ions using an o-hydroxypropiophenoxime resin
[IS-T-801] N78-33178
Effect of radiation and acids on thermal stability of ion exchange resins
[RFP-2652] N78-33238
ION IMPLANTATION
Ion implantation of wide bandgap semiconductors --- silicon n-type semiconductors
[AD-A056125] N78-33968
ION RECOMBINATION
Binary positive ion-negative ion mutual neutralization reactions
[AD-A056649] N78-33166
IONIC REACTIONS
Overview: History and perspective of the search for superheavy elements
[CONF-780333-2] N78-33898
IONIZATION
Pulsed positive negative ion chemical ionization mass spectrometry
N78-33156
The ionization of uranium atoms by electron impact
N78-33894
IONIZATION CROSS SECTIONS
Report of progress in the development of an electron impact ionization model
[AD-A056363] N78-33907

IONIZING RADIATION
The preventive role of ultraviolet radiation during exposure to ionizing radiation
[NASA-TM-75106] N78-33710
IONOSONDES
A new Finnish ionosonde IS-14
[REPT-28] N78-33648
IONOSPHERE
ELF propagation in a non-stratified earth-ionosphere waveguide
[AD-A056143] N78-33295
Some properties of high latitude sporadic E
[REPT-29] N78-33651
IONOSPHERIC DISTURBANCES
Analysis of stress ionograms
[AD-A056388] N78-33659
Behavior of the ionospheric F-region during geomagnetic storms
[AD-A056978] N78-33664
IONOSPHERIC ELECTRON DENSITY
Analysis of electron density-profiles in the lower ionosphere
[AD-A057254] N78-33665
IONOSPHERIC PROPAGATION
Test particle correlation by a whistler wave in a nonuniform magnetic field
[AD-A057065] N78-33302
High-latitude ionospheric studies in Finland
[REPT-25] N78-33652
Ionospheric refraction corrections in the GTDS for satellite-to-satellite tracking data
[NASA-CR-156834] N78-33654
Analysis of electron density-profiles in the lower ionosphere
[AD-A057254] N78-33665
IONOSPHERIC SOUNDING
Geosynchronous Microwave Atmospheric Sounding Radiometer [MASR] antenna feasibility study. Volume 3: Antenna feasibility
[NASA-CR-156825] N78-33646
A new Finnish ionosonde IS-14
[REPT-28] N78-33648
IONS
Tokamak confinement
[PPPL-1442] N78-33945
IRAN
TRSB microwave landing system demonstration program at Shiraz, Iran
[AD-A055526] N78-33071
IRON
Coal desulfurization
[NASA-CASE-NPO-14272-1] N78-33164
Formation of iron carbonyl between a 1/2% Mo steel and high-pressure gases containing carbon monoxide
[ORNL-5410] N78-33215
IRON ALLOYS
Review of the low-temperature properties of metals: A digest of selected literature
N78-33143
Electronic structure of ternary alloys --- iron-nickel-aluminum alloys
[AD-A056356] N78-33198
Machine casting of ferrous alloys
[AD-A056824] N78-33204
IRON METEORITES
Cooling rate variations within the group IV A iron meteorites
N78-34016
IRON ORES
Kinetics of iron ore reduction
N78-33186
IRRADIATION
Effect of ultrasonic waves on the kinetics of polymerization
N78-33226
Change in reflectivity of a metal surface during intense laser irradiation
N78-33420
ITERATIVE SOLUTION
An efficient direct solver for separable and non-separable elliptic equations
[AD-A056360] N78-33835
Shifted incomplete Cholesky factorization --- linear systems and matrix theory
[SAND-78-8226] N78-33841

J

J-85 ENGINE
Blade row dynamic digital compression program. Volume 2: J85 circumferential distortion redistribution model, effect of Stator characteristics, and stage characteristics sensitivity study
[NASA-CR-134953] N78-33103
JET AIRCRAFT NOISE
Comparison of low-frequency noise levels of the Concorde supersonic transport with other commercial service airplanes
[NASA-TM-78736] N78-33873
Noise-induced building vibrations caused by concorde and conventional aircraft operations at Dulles and Kennedy International Airports
[NASA-TM-78769] N78-33874
Propagation of sound through a sheared flow
[NASA-CR-152196] N78-33876
JET ENGINES
Non-extractive electro-optical measurement of jet-engine emissions
[AD-A056783] N78-33105
JET FLOW
Evolution of an FR-80 generated movie of opposed jet fluid flow
[K/CSD/INF-78/15] N78-33393
JET IMPINGEMENT
Axisymmetric air jet impinging on a hemispherical concave plate
N78-33039
Viscous entrainment of mass and energy in fluid dynamic energy separation
N78-33376
JOINTS [JUNCTIONS]
Interactive composite joint design. Part 2: User's manual
[AD-A056712] N78-33449
Flaw growth in complex structure. Volume 1: Technical discussion
[AD-A056372] N78-33483
JOSEPHSON JUNCTIONS
Flexible system having two selectable ratios for use with Josephson voltage devices with 2 selectable ratios
[SAND-77-2121C] N78-33356
JUNCTIONS
Charge condition at the junction of unequal radii wires. Part 2: Current distribution on thick cylindrical structures
[AD-A056894] N78-33307
JUPITER ATMOSPHERE
Pioneer Jupiter orbiter probe mission 1980, probe description
[NASA-CR-137591] N78-33127
JUPITER PROBES
Pioneer Jupiter orbiter probe mission 1980, probe description
[NASA-CR-137591] N78-33127

K

KALMAN FILTERS
Missile aerodynamic parameter and structure identification from flight test data
[AD-A056343] N78-33055
Continuous Kalman updating of an inertial navigation system using terrain measurements
[SAND-78-0421C] N78-33083
KERNEL FUNCTIONS
On linear operations realizable in coherent optical processor
N78-33910
KEROGEN
Thermal conversion of oil-shale kerogen using CO and water at elevated pressures
[LERC-78/1] N78-33552
KEVLAR [TRADEMARK]
Impact tests on fibrous composite sandwich structures
[NASA-TM-78719] N78-33152
KINETIC ENERGY
An analysis of the kinetic energy of two extratropical cyclones
N78-33673
KINETIC EQUATIONS
Kinetic transport properties of a bumpy torus with finite radial ambipolar field
[ORNL/TM-6215] N78-33942
KINETICS
Computational study of physical and chemical flame inhibition
[LBL-6899] N78-33181
Precipitation kinetics of a continuous precipitator, with application to the precipitation of ammonium polyuranate
N78-33951

L

LABORATORIES
The multiprogram laboratories: A national resource for nonnuclear energy research, development, and demonstration
[PB-281265/9] N78-33607
LAMINAR FLOW
Deposition of suspensions in laminar flow in the entrance region of channels with diffusive, electrostatic and gravitational effects
N78-33369
LAMINATES
Electrical conductivity of selected graphite intercalation compounds in the temperature range between 4 and 300 Kelvin degrees
[AD-A056429] N78-33350
LAND USE
Regional flood analyses and land use planning in an area of inadequate data Santa Cruz County, California
N78-33501
Land use planning issues and the Alaska gas pipeline: A report to the President
[PB-281327/7] N78-33522
LANDAU DAMPING
Nonlinear Landau damping in mirror plasmas
[SAI-78-529-LJ] N78-33941
LANDSAT D
PLACE: Post LANDSAT D Advanced Concept Evaluation
[E78-10156] N78-33506
LANDSAT SATELLITES
Discrimination of rock classes and alteration products in southwestern Saudi Arabia with computer-enhanced LANDSAT data
[NASA-TP-1327] N78-33499
LANDSAT 1
Ecosystem mapping by interpretation of landscapes from satellite imagery
N78-33503
LARGE SCALE INTEGRATION
A study of alternatives for VSTOL computer systems
[AD-A056105] N78-33098
The accelerating nature of electrical bias on moisture induced failures of MOS/LSI devices
N78-33336
Integrated injection logic [I2L]. Comparative and design trade-off evaluation
[AD-A056392] N78-33342
Architecture for multiple instruction stream LSI processors
[AD-A056110] N78-33751
LARGE SPACE STRUCTURES
Structural efficiency of long lightly loaded truss and isogrid columns for space applications
[NASA-TM-78687] N78-33480
LASER APPLICATIONS
Sub-part-per-trillion detection of organics in aqueous solution by laser induced molecular fluorescence
[UCRL-80038] N78-33174
Sodium vapor heat pipe laser cell
[LA-UR-78-532] N78-33392
Laser-error-correction control unit for machine tools
[Y-2129] N78-33453
Laser light source illuminating device design features discussed
N78-34029
LASER DOPPLER VELOCIMETERS
Laser-velocimeter surveys of merging vortices in a wind tunnel: Complete data and analysis
[NASA-TM-78449] N78-33043
LASER FUSION
LASL laser mirror program: Excerpts from 1/-12 Development Division
[Y-DA-7591] N78-33436
Effect of a nonlinear refractive index on Faraday rotation
N78-33903
LASER OUTPUTS
Laser far-field beam-profile measurements by the focal plane technique
[PB-281542/1] N78-33438
LASER PLASMA INTERACTIONS
Spatially, and temporally resolved harmonic emission studies of laser produced plasmas
N78-33928
LASER PLASMAS
High beta capture and mirror confinement of laser produced plasmas --- electron cyclotron resonance heating
[COO-2277-10] N78-33946
LASER PUMPING
Research in laser processes
[AD-A056030] N78-33427
Nuclear pumping of a neutral carbon laser
[COO-2007-94] N78-33434
LASER RANGER/TRACKER
Determining crustal strain rates with a spaceborne geodynamics ranging system. 2: Station coordinate analysis
[NASA-TM-79627] N78-33647
LASER SPECTROSCOPY
Multiphoton absorption spectroscopy of lithium
N78-33891
Soviet laser spectroscopy research reviewed
N78-34034
LASER TARGET DESIGNATORS
Unstable resonators for Army laser designators
[AD-A056432] N78-33430
Unstable resonator retrofitted handheld laser designator
[AD-A057248] N78-33432
LASERS
Light emitting diodes, volume 2. A bibliography with abstracts
[NTIS/PS-78/0736/5] N78-33362
Multiple cavity laser holographic system
[SAND-78-0496] N78-33417

Calculation of the energetics and collision dynamics of electronic transition lasers
[AD-A056896] N78-33428
An investigation of the gaseous character of the atmosphere at the high energy laser test facility HELSTF at the White Sands Missile range [WSMR]
[AD-A056378] N78-33429
Nuclear pumping of a neutral carbon laser
[NASA-CR-157728] N78-33435

LATENESS
Airline delay trends, 1972-1977
[AD-A056867] N78-33062

LATTICE VIBRATIONS
Lattice dynamics of alpha uranium
N78-33967

LATTICES [MATHEMATICS]
Lattice field theories: Non-perturbative methods of analysis
[SLAC-PUB-2073] N78-33975

LAW [JURISPRUDENCE]
Survey of environmental regulations applying to geothermal exploration, development, and use
[PB-281023/2] N78-33672

LEAD [METAL]
Survey of the occurrence of mercury, lead, and cadmium in the Washington, D. C. area
[PB-281725/2] N78-33629

LEAD ACID BATTERIES
Lead batteries. Citations from the NTIS data base
[NTIS/PS-78/0689/6] N78-33605
Lead batteries. Citations from the engineering index data base
[NTIS/PS-78/0690/4] N78-33606

LEAD ALLOYS
Strain enhanced spheroidization and superplastic flow in a lead-tin eutectic alloy, part A. Development of a phenomenological equation for superplastic flow of fine grained materials, part B
N78-33188

LEAD SULFIDES
Optical and physical properties of evaporated PbS film
[SAND-79-0300] N78-33973

LEAD TELLURIDES
Far infrared cyclotron resonance in semiconducting lead telluride
N78-33950

LEADING EDGES
Effects of wing leading-edge deflection on the low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration
[NASA-TM-78787] N78-33047
Estimation of leading-edge thrust for supersonic wings of arbitrary planform
[NASA-TP-1270] N78-33051

LEAKAGE
Propagating modes on a buried leaky coaxial cable
[AD-A057253] N78-33308
Study of improvement of hydrogen maser frequency standard
[NASA-CR-156836] N78-33425

LEAR JET AIRCRAFT
Ozone concentration in the cabin of a Gates Learjet measured simultaneously with atmospheric ozone concentrations
[NASA-TP-1340] N78-33618

LEAST SQUARES METHOD
A parameter estimation subroutine package
[NASA-CR-157766] N78-33789
Sequential least squares estimation of slowly time-varying parameters --- applicable to digital signal processing
N78-33834

LENSES
Performance, evaluation, and specification for coherent optical processors
N78-33911

LIBRARIES
Initial considerations for a nationwide data base
[ISSN-0160-9742] N78-33983
Systems analysis of scientific and technical communication in the United States: The electronic alternative to communication through paper-based journals
[PB-281847/4] N78-33986
Machine-readable identification system for library materials
[PB-282499/3] N78-33998

LIFE [DURABILITY]
The practical impact of elastohydrodynamic lubrication
[NASA-TM-78987] N78-33445
Estimation and testing of hypotheses for distributions in accelerated life tests
[AD-A056096] N78-33465
Stress-rupture life of Kevlar/epoxy spherical pressure vessels
[UCID-17755-PT-1] N78-33492

LIFE CYCLE COSTS
AFSATCOM life cycle cost model
[AD-A056102] N78-33131
Terrestrial central station array life-cycle analysis support study
[NASA-CR-157772] N78-33534

LIFTING REENTRY VEHICLES
Comparison of concurrent strain gage- and pressure transducer-measured flight loads on a lifting reentry vehicle and correlation with wind tunnel predictions
[NASA-TP-1331] N78-33053

LIGHT [VISIBLE RADIATION]
Measurement of absorption coefficients of water in the visible spectral region, phase 1 and 2
[PB-281500/9] N78-33182

LIGHT AIRCRAFT
The analysis of National Transportation Safety Board small multiengine fixed-wing aircraft accident/incident reports for the potential presence of low-level wind shear
[AD-A056780] N78-33063

LIGHT BEAMS
Investigations of the coherence properties of a ring laser
N78-33421

LIGHT EMISSION
Spatially, and temporally resolved harmonic emission studies of laser produced plasmas
N78-33928

LIGHT EMITTING DIODES
Light emitting diodes, volume 2. A bibliography with abstracts
[NTIS/PS-78/0736/5] N78-33362

LIGHT SCATTERING
Stimulated Raman scattering involving two plasma waves
[AD-A056855] N78-33936

LIGHT SCATTERING METERS
Determination of particle size using measurement of scatter
[NASA-CR-157741] N78-33914

LIGHT SOURCES
Laser light source illuminating device design features discussed
N78-34029

LIGHTNING
Two lightning-flash counter systems
[AD-A057369] N78-33655

LINE SPECTRA
Proposed rocket experiments to measure the profile and intensity of the solar He1584A resonance line
[NASA-CR-156779] N78-34023

LINEAR ARRAYS
High-temperature linear radiation-cavity solar collector with a Fresnel concentrator
N78-33524

LINEAR PROGRAMMING
Automated resizing optimization of generally loaded planar frames via linear programming techniques
[AD-A056567] N78-33482
Analog algebraic decoding of linear block codes
N78-33768
Aggregation in linear programming
N78-33774
A special purpose linear programming algorithm for obtaining least absolute value estimators in a linear model with dummy variables
[AD-A056762] N78-33796

LINEAR SYSTEMS
Adaptive stochastic control of linear systems with random parameters
[AD-A056849] N78-33822
Functional expansions in bilinear system analysis
N78-33831
Shifted incomplete Cholesky factorization --- linear systems and matrix theory
[SAND-78-8226] N78-33841

LINEAR TRANSFORMATIONS
On linear operations realizable in coherent optical processor
N78-33910

LINES OF FORCE
Two problems involving imperfect conductivity in a collisionless plasma
N78-33929

LIQUID CRYSTALS
Liquid crystals. A bibliography with abstracts
[NTIS/PS-78/0767/0] N78-33974

LIQUID FILLED SHELLS
Lagrangian finite-difference calculations of an explosion in a partially water-filled rigid cylindrical tank
[SAND-77-1394] N78-33488

LIQUID HELIUM
The specific heat of helium four near the superfluid transition in a confined geometry
N78-33966

LIQUID METALS
Performance investigations of liquid-metal heat pipes for space and terrestrial applications
[LA-UR-78-547] N78-33396
Local measurements in two-phase liquid-metal MHD
[CONF-780336-2] N78-33943

LIQUID PHASES
The morphology and stability of material phases
N78-33364

LIQUID-SOLID INTERFACES
Raleigh-like reflection of ultrasonic waves at a liquid-solid layer-solid interface
[AD-A056975] N78-33878

LIQUID-VAPOR EQUILIBRIUM
Vapor-liquid equilibria in multicomponent aqueous solutions of volatile electrolytes
N78-33157
Measuring and predicting the dynamic effects of a confined thin metal plate pulse heated into the liquid-vapor regime
N78-33192

LIQUID-VAPOR INTERFACES
Performance investigations of liquid-metal heat pipes for space and terrestrial applications
[LA-UR-78-547] N78-33396

LIQUIDS
Measurement of the thermal conductivity of liquids
[PB-281706/2] N78-33183
A mean spherical model for soft potentials: The hard core revealed as a perturbation
[NASA-CR-157771] N78-33381
Piezo-optic properties of liquids under high pressure
[AD-A055448] N78-33969

LITERATURE
Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume I
[AD-A056311] N78-33718
Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 2
[AD-A056312] N78-33719

LITHIUM
Lithium literature review: Lithium's properties and interactions
[HEDL-TME-78-15] N78-33180
Lithium batteries, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0660/7] N78-33603
Lithium batteries. Citations from the engineering index data base
[NTIS/PS-78/0661/5] N78-33604
Multiphoton absorption spectroscopy of lithium
N78-33891
Modulated electron beam heating of a contact ionized lithium plasma in a mirror machine
N78-33924

LITHIUM ALLOYS
Lithium-boron alloy anodes for molten salt batteries [2]
[AD-A057258] N78-33544

LITHIUM COMPOUNDS
Electrochemical reduction of thionyl chloride in solutions containing lithium tetrachloroaluminate
[AD-A056123] N78-33167
Sealed primary lithium-inorganic electrolyte cell
[AD-A056370] N78-33543

LITHIUM FLUORIDES
Impression creep of LiF and Cu-Ni single crystals
N78-33956

LITHOLOGY
Geology of the northern Sierra Nevada basement rocks, Quincy-Downieville area, California
N78-33640

LOAD TESTS
Acoustic emission testing of composite vessels under sustained loading
[NASA-TM-78981] N78-33150
Room-temperature inelastic test of a nozzle-to-spherical-shell model subjected to pressure and moment loading
[ORNL/TM-6170] N78-33490

LOADS [FORCES]
Assessment of load alleviation devices installed on a power-augmented-ram wing over irregular waves
[AD-A045425] N78-33049
An investigation of the orthogonal collocation method with applications to some structural mechanics problems
N78-33476
Structural efficiency of long lightly loaded truss and isogrid columns for space applications
[NASA-TM-78687] N78-33480

LOGIC CIRCUITS
B-1 EMUX automated logic diagrammer demonstration program
[AD-A056964] N78-33092
Integrated injection logic [I2L]. Comparative and design trade-off evaluation
[AD-A056392] N78-33342
The design of multivalued logic gates and fault detection in multivalued logic networks
N78-33750

LOGIC DESIGN
Project RMAG: Symbolic logic retrieval source code
[PB-281373/1] N78-33979
Project RMAG: Symbolic logic retrieval users guide
[PB-281374/9] N78-33980

LOGISTICS MANAGEMENT
System Avionics Value Estimation [SAVE]: An aid for avionics logistics-and-support-cost analyses
[AD-A056348] N78-33097

LONG TERM EFFECTS
Long-term hot-hardness characteristics of five through-hardened bearing steels
[NASA-TP-1341] N78-33196
LORAN C
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 1: Executive summary
[AD-A056740] N78-33074
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 2: Analysis
[AD-A056741] N78-33075
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirements of CONUS, Alaska, and offshore. Volume 3: Supporting appendices
[AD-A056742] N78-33076
LOW FREQUENCIES
Comparison of low-frequency noise levels of the Concorde supersonic transport with other commercial service airplanes
[NASA-TM-78736] N78-33873
LOW TEMPERATURE
Review of the low-temperature properties of metals: A digest of selected literature
N78-33144
Current voltage characteristics of gallium-arsenide metal epitaxial semiconductor field effect transistors at cryogenic temperatures
N78-33337
LOW TEMPERATURE ENVIRONMENTS
Economic feasibility of strontium-90 fueled heaters for use in cold regions
[PNL-2476] N78-33546
LOW VISIBILITY
Computer simulation of the visual effects of smoke plumes
[LA-UR-78-689] N78-33625
LOWER ATMOSPHERE
Low-layer features of two limited-area hurricane regimes
[PB-283079/2] N78-33690
LUBRICANTS
Degradation studies of a trimethylolpropane triheptanoate lubricant basestock
[AD-A056825] N78-33237
LUBRICATION
The practical impact of elastohydrodynamic lubrication
[NASA-TM-78987] N78-33445
Minimum film thickness in elliptical contacts for different regimes of fluid-film lubrication
[NASA-TP-1342] N78-33447
Ultrasonic lubrication
[AD-A056050] N78-33448
LUMBAR REGION
The lumbosacral segment as a vulnerable region in various postures
[NASA-TM-75579] N78-33713
LUMINESCENCE
Luminescent decay and spectra of impurity-activated alkali halides under high pressure
[COO-1198-1191] N78-33173
LUNAR SOIL
Infrared spectra of lunar soil analogs --- spectral reflectance of minerals
[NASA-CR-157742] N78-34020

M

MACHINE TOOLS
Machine casting of ferrous alloys
[AD-A056824] N78-33204
Laser-error-correction control unit for machine tools
[Y-2129] N78-33453
MAGNESIUM
Forced-flow chromatographic determination of calcium and magnesium with continuous spectrophotometric detection
[IS-T-806] N78-33179
MAGNESIUM OXIDES
Microstructurally developed toughening mechanisms in ceramics. Fracture toughness of Si3N4 as a function of the initial alpha-phase content
[AD-A057241] N78-33233
MAGNETIC DOMAINS
Magnetic bubble domain wall dyanmics in gradient translation
N78-33334
MAGNETIC FIELDS
High frequency behavior of source excited concave surfaces
N78-33475
MAGNETIC FLUX
Magnetic bubble domain wall dyanmics in gradient translation
N78-33334
MAGNETIC MIRRORS
High beta capture and mirror confinement of laser produced plasmas --- electron cyclotron resonance heating
[COO-2277-10] N78-33946
MAGNETIC RELAXATION
Two problems involving imperfect conductivity in a collisionless plasma
N78-33929
MAGNETIC STORMS
The onset of an auroral absorption substorm
[REPT-24] N78-33649
Studies of the onset of an auroral absorption substorm
[REPT-26] N78-33650
Behavior of the ionospheric F-region during geomagnetic storms
[AD-A056978] N78-33664
MAGNETICALLY TRAPPED PARTICLES
High beta capture and mirror confinement of laser produced plasmas --- electron cyclotron resonance heating
[COO-2277-10] N78-33946
MAGNETOHYDRODYNAMIC GENERATORS
Local measurements in two-phase liquid-metal MHD
[CONF-780336-2] N78-33943
MAGNETOHYDRODYNAMIC STABILITY
Equilibrium and nonlocal stability properties of bounded relativistic electron beam-plasma systems
N78-33923
Anomalous transport coefficients due to the ion-ion two-stream plasma microinstability
[AD-A056542] N78-33930
MAGNETOMETERS
Evaluation of a triaxial SQUID magnetometer designed for use as an ELF magnetic antenna
[AD-A056361] N78-33293
Investigation of micropulsation activity. 1: MAGAF system additions. 2: Data analysis
[AD-A056716] N78-33661
MAGNETOSPHERE
Test particle correlation by a whistler wave in a nonuniform magnetic field
[AD-A057065] N78-33302
The behavior of gridded spherical and planar electron probes in a non-Maxwellian plasma
[AD-A056961] N78-33933
Particle acceleration in pulsar magnetospheres
[NASA-CR-157768] N78-34015
MAGNUS EFFECT
Measurements in the turbulent boundary layer of a yawed, spinning body of revolution at Mach 3.0 with a laser velocimeter and impact probe
[AD-A057237] N78-33059
MAINTAINABILITY
Reliability, availability and maintainability analysis of the AQUILA remotely piloted vehicle system
[AD-A056942] N78-33090
MAINTENANCE
Residual stresses at weld repairs in pressure vessels
[PB-281853/2] N78-33497
Certification and verification for Calmac flat plate solar collector
[NASA-CR-150784] N78-33532
MAN MACHINE SYSTEMS
An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance
[AD-A057113] N78-33733
A design-interpretation analysis of natural English with applications to man-computer interaction
[AD-A056121] N78-33752
MANAGEMENT INFORMATION SYSTEMS
Management information system for ESD program offices
[AD-A056103] N78-33977
National Computer Center personnel management information system design requirements specification. Volume 1: Design requirements and data dictionary
[PB-282589/1] N78-33981
National Computer Center personnel management information system design requirements specification. Volume 2: Report index and formats
[PB-282590/9] N78-33982
MANAGEMENT METHODS
A network augmenting path basic algorithm for transshipment problems
[AD-A056761] N78-33869
Comparative issues and methods in organizational diagnosis. Report 2: The decision tree approach
[AD-A057160] N78-33978
MANAGEMENT PLANNING
Environmental development plan for electric energy systems program, 1977
[DOE/EDP-0016] N78-33554
Environmental development plan for Conservation Research and Technology Program, 1977
[DOE/EDP-0017] N78-33555
Demonstration project as a procedure for accelerating the application of new technology. Charpie task force report, volume 1
[DOE/RA-0003/1-VOL-1] N78-33563
Demonstration project as a procedure for accelerating the application of new technology. Charpie task force report, volume 2
[DOE/RA-0003/2-VOL-2] N78-33564
Air Force aircrew training devices: Master plan
[AD-A056940] N78-33734
Planning telecommunications systems: A normative approach
N78-33866
Management information system for ESD program offices
[AD-A056103] N78-33977
MANGANESE
Measurement of transition probabilities for Mn I lines and the manganese solar abundance
N78-33890
MANGANESE COMPOUNDS
Exciton dynamics and energy transfer in pure and doped manganese fluoride
N78-33965
MANGANESE ISOTOPES
Nuclear lifetimes in manganese-52
N78-33905
MANIPULATORS
The statistical manipulation of delphi statements
N78-34003
MANNED ORBITAL RESEARCH LABORATORIES
Biological experiments on board Salyut-6
N78-34032
MANUALS
Manual for the application of NURE 1974-1977 aerial gamma-ray spectrometer data
[GJBX-13-78] N78-33519
MANUFACTURING
Floating substrate process: Large-area silicon sheet task low-cost solar array project
[NASA-CR-157759] N78-33265
Development and fabrication of a concentrating solar collector subsystem
[NASA-CR-150787] N78-33529
Potential for cogeneration development in six major industries by 1985
[HCP/M60172-01/2] N78-33551
MAPPING
Ecosystem mapping by interpretation of landscapes from satellite imagery
N78-33503
Quantitative mapping by remote sensing of an ocean acid-waste dump
[NASA-TP-1275] N78-33617
The transition-map-entered-variable [T-MEV] mapping technique for sequential machine design
N78-33749
A methodology for nonlinear feature extraction in statistical pattern recognition
N78-33819
MARINE BIOLOGY
Techniques for sampling and analyzing the marine macrobenthos
[PB-281631/2] N78-33697
MARINER 6 SPACE PROBE
Application of photometric analyses for interpretation of Mars-Mariner VI and VII imagery
[NASA-CR-157757] N78-34019
MARINER 7 SPACE PROBE
Application of photometric analyses for interpretation of Mars-Mariner VI and VII imagery
[NASA-CR-157757] N78-34019
MARS [PLANET]
Tectonic asymmetry of the earth and other planets
[NASA-TM-75576] N78-33643
MARS SURFACE
Application of photometric analyses for interpretation of Mars-Mariner VI and VII imagery
[NASA-CR-157757] N78-34019
MARTENSITE
Microstructurally developed toughening mechanisms in ceramics. Stress-induced martensitic reactions. 1: Theory of metastable phase retention and contribution to fracture toughness
[AD-A057239] N78-33231
MASKING
The effort of noise exposure on the masking level difference
N78-33709
MASS SPECTROMETERS
A digital control unit for a rocket borne quadrupole mass spectrometer
[AD-A057251] N78-33141
The design and operation of an automated, high-efficiency photoionization mass spectrometer
[AD-A056269] N78-33412
MASS SPECTROSCOPY
Pulsed positive negative ion chemical ionization mass spectrometry
N78-33156
New techniques for the analysis of thermolysis products
N78-33163
High efficiency collision-induced dissociation in an RF-only quadrupole
[AD-A057201] N78-33171

MASS TRANSFER
A theoretical study on oxidative catalytic monoliths --- carbon monoxide oxidation and mass and heat transport
N78-33158
Mass transport and acid-base generation in solution/membrane systems: Extension of Nernst-Planck treatment to electrolytic multicomponent systems
N78-33159
Microprobe method for studying gas-liquid oxygen transfer in various surfactant systems
N78-33160

MATCHED FILTERS
The performance of digital matched filters for multilevel signals
N78-33280
The effect of multipath interference on the performance of a digital matched filter
N78-33329

MATERIALS
Hazardous material spills: A documentation and analysis of historical data
[PB-281090/1] N78-33631

MATHEMATICAL MODELS
A distribution model for the aerial application of granular agricultural particles
[NASA-CR-157745] N78-33048
Convection induced by G-jitter in rectangular enclosures aboard spacecraft
N78-33084
AFSATCOM life cycle cost model
[AD-A056102] N78-33131
Computational study of physical and chemical flame inhibition
[LBL-6899] N78-33181
Transient and failure analyses of porous zinc electrodes
N78-33187
Vulnerability of surface effect vehicles to explosion generated water waves
[AD-A055503] N78-33267
Parameter estimation for generator simulation studies
[AD-A057006] N78-33351
A numerical study of upstream blocking and internal waves in a density stratified fluid
N78-33370
Investigation into the effects of weapon setback on various materials and geometries
[AD-A057236] N78-33450
Creation of lumped parameter thermal model by the use of finite elements
[NASA-CR-158944] N78-33479
Simple economic model for energy research and supply strategies, draft
[DOE/ER-0005/D] N78-33557
Atmospheric and Geophysical Sciences Division, Physics Department program report, FY 1977
[UCRL-51444-77] N78-33624
Rapid techniques for calculating the Pollution Standards Index [PSI]
[PB-282028/0] N78-33635
Dynamical model of gust front
[PB-283425/7] N78-33692
Aggregation in linear programming
N78-33774
A study of geometric set-membership classification
[PB-281573/6] N78-33843
Mathematical models of rigid solid objects
[PB-281535/5] N78-33844
An estimation procedure for the 3-parameter Weibull distribution in modeling hypertension data
N78-33854
Hierarchical analysis of systems
N78-33865
A note on ancillarity and independence via model-preserving transformations
[AD-A056344] N78-33870
Study of ice growth in slightly undercooled water
N78-33871
Precipitation kinetics of a continuous precipitator, with application to the precipitation of ammonium polyuranate
N78-33951

MATRICES [MATHEMATICS]
DYGABCD: A program for calculating linear A, B, C, and D matrices from a nonlinear dynamic engine simulation
[NASA-TP-1295] N78-33110

MATRIX THEORY
Shifted incomplete Cholesky factorization --- linear systems and matrix theory
[SAND-78-8226] N78-33841

MEASURING INSTRUMENTS
Technique for measurements of plane waves of uniaxial strain
[SAND-77-0199C] N78-33494

MECHANICAL DEVICES
Extension mechanisms for high-level programming languages
N78-33775
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0665/6] N78-33882

MECHANICAL DRIVES
Two-channel high-speed drive for an optical sighting device, operating under conditions of a random moment of load on the output shaft
N78-34030

MECHANICAL ENGINEERING
Mechanical system identification and decomposition by dynamic data system methodology
N78-33443
Constructive solid geometry
[PB-281613/0] N78-33842

MECHANICAL PROPERTIES
Review of the low-temperature properties of metals: A digest of selected literature
N78-33143
Review of the low-temperature properties of metals: A digest of selected literature
N78-33144
Mechanical and thermal properties of sialon alumina composites
N78-33146
Development of graphite/polyimide honeycomb core materials
[NASA-CR-158921] N78-33148
Thermal and molecular effects on solid state behavior of rigid poly[vinylchloride]
N78-33227
Polycarbonates: Properties, synthesis, and applications. A bibliography with abstracts
[NTIS/PS-78/0754/8] N78-33247
Investigation into the effects of weapon setback on various materials and geometries
[AD-A057236] N78-33450

MEDICAL EQUIPMENT
Fast neutron depth dose distributions in a heterogeneous phantom
N78-33712
Optical probe --- a rectal probe
[NASA-CASE-NPO-14247-1] N78-33715

MENTAL PERFORMANCE
Environmental noise: The effects of information overload and control over the work environment on performance during and after exposure
N78-33612
An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance
[AD-A057113] N78-33733

MERCURY [METAL]
Survey of the occurrence of mercury, lead, and cadmium in the Washington, D. C. area
[PB-281725/2] N78-33629

MERCURY [PLANET]
Tectonic asymmetry of the earth and other planets
[NASA-TM-75576] N78-33643

METAL COMPOUNDS
Magnetic properties of two dilute spin systems --- amorphous metals
N78-33957

METAL FATIGUE
Crack tip plasticity associated with corrosion-assisted fatigue --- carbon steels
[AD-A056860] N78-33487

METAL FILMS
Size effects and electron microscopy of thin metal films
[NASA-CR-157746] N78-33194

METAL HYDRIDES
Reversible metal hybride-air fuel cell
[AD-A056591] N78-33540

METAL IONS
Separation of metal ions using an o-hydroxypropiophenoxime resin
[IS-T-801] N78-33178

METAL OXIDE SEMICONDUCTORS
The accelerating nature of electrical bias on moisture induced failures of MOS/LSI devices
N78-33336

METAL PLATES
Measuring and predicting the dynamic effects of a confined thin metal plate pulse heated into the liquid-vapor regime
N78-33192

METAL POWDER
Methanation catalysts: Activity, adsorption and degradation studies of nickel and nickel bimetallic catalysts for methanation
N78-33161

METAL SHEETS
Floating substrate process: Large-area silicon sheet task low-cost solar array project
[NASA-CR-157759] N78-33265

METAL SURFACES
Early stages of the oxidation of metal surfaces --- photoelectron spectroscopy of zinc oxide
[NASA-CR-157767] N78-33195
Change in reflectivity of a metal surface during intense laser irradiation
N78-33420
Interactions of atoms with solid surface: Nonadiabatic mechanism for the production of excited state hydrogen and helium atoms at a metal surface
N78-33889
Experimental and theoretical study of the surface states/surface resonances on the [100] faces of group VIP transition metals
N78-33964

METAL-WATER REACTIONS
Catalog information on the performance of aluminum in sea water --- ocean thermal energy conversion
[PNL-2606] N78-33211

METALS
Pore shrinkage and Ostwald ripening in metallic systems
[COO-4385-2] N78-33222
Physically-based internal variable model for rate-dependent plasticity
[SAND-78-0181C] N78-33495
Creep-recovery constitutive equation and its time-independent limit
[CONF-780540-1] N78-33496

METASTABLE STATE
Microstructurally developed toughening mechanisms in ceramics. Stress-induced martensitic reactions. 1: Theory of metastable phase retention and contribution to fracture toughness
[AD-A057239] N78-33231

METEORITES
Meteor ablation spheres from deep-sea sediments
[NASA-TM-78510] N78-34021

METEOROLOGICAL FLIGHT
Flight data of electric field thunderstorm research international project, trip 76, July 1976
[NASA-CR-15779] N78-33693

METEOROLOGICAL INSTRUMENTS
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, fall 1976
[AD-A057144] N78-33660
Analysis of conjunctive rocketborne inflatable sphere and bead thermistor soundings
[AD-A056943] N78-33662
Fog prediction. A bibliography with abstracts
[NTIS/PS-78/0775/3] N78-33694

METEOROLOGICAL PARAMETERS
An analysis of the kinetic energy of two extratropical cyclones
N78-33673
A large scale ocean-atmosphere interaction model
N78-33675
Management of atmospheric data
N78-33782

METEOROLOGICAL RADAR
Acoustic sounder array for application to air pollution. Volume 1: Executive summary and user guide
[PB-282064/5] N78-33670
Acoustic sounder array for application to air pollution. Volume 2: Case studies and other appendices
[PB-282065/2] N78-33671
Applications of polarization-diversity radar and lidar in meteorology
[AD-A056571] N78-33678

METEOROLOGICAL SATELLITES
National hurricane operations plan
[PB-282838/2] N78-33689

METHANE
Methanation catalysts: Activity, adsorption and degradation studies of nickel and nickel bimetallic catalysts for methanation
N78-33161
Optical gain in optically pumped methanol and its application to a FIR preamplifier
N78-33912

METHYL ALCOHOLS
A 1.5 kW methanol fuel cell powerplant
[AD-A057145] N78-33541

MICE
Micro-fluid exchange coupling apparatus --- a microrespirator to allow surgery on rats or mice
[NASA-CASE-ARC-11114-1] N78-33717

MICROANALYSIS
Plural output optimetric sample cell and analysis system
[NASA-CASE-NPO-10233-1] N78-33913

MICROCLIMATOLOGY
The combined effect of an SHF field and an unfavorable microclimate on the body
N78-33730

MICROCOMPUTERS
Distributed data processing: Microcomputer elements and design aids
N78-33766

MICROELECTRONICS
Integrated injection logic [I2L]. Comparative and design trade-off evaluation
[AD-A056392] N78-33342
Computer aided design of microcircuits. Citations from the engineering data base
[NTIS/PS-78/0822/3] N78-33361
Ferrite microwave electronics, volume 3. A bibliography with abstracts
[NTIS/PS-78/0738/1] N78-33363
Active devices for high temperature microcircuitry
[SAND-77-1145] N78-33414

MICROMETEOROIDS
Are the stratospheric dust particles meteor ablation debris or interplanetary dust?
[NASA-TM-78507] N78-34014

MICROPARTICLES
Are the stratospheric dust particles meteor ablation debris or interplanetary dust?
[NASA-TM-78507] N78-34014
MICROPROCESSORS
System design of parallel microprocessors for solving partial differential equations
N78-33747
MICROPULSATIONS
Investigation of micropulsation activity. 1: MAGAF system additions. 2: Data analysis
[AD-A056716] N78-33661
MICROSTRUCTURE
Effect of microstructure on fatigue properties of Ti-6Al-4V
N78-33189
Studies of microstructure-property relationships in austenitic stainless steels
[ORO-4044-7] N78-33218
Microstructurally developed toughening mechanisms in ceramics. Stress-induced martensitic reactions. 1: Theory of metastable phase retention and contribution to fracture toughness
[AD-A057239] N78-33231
Microstructurally developed toughening mechanisms in ceramics. Fracture toughness of Si3N4 as a function of the initial alpha-phase content
[AD-A057241] N78-33233
Microstructurally developed toughening mechanisms in ceramics. Compressive surface stresses developed in ceramics by an oxidation-induced phase change
[AD-A057242] N78-33234
MICROWAVE AMPLIFIERS
Phased array antenna amplifier exploratory development model [100 watts]
[AD-A056173] N78-33301
MICROWAVE ANTENNAS
Geosynchronous Microwave Atmospheric Sounding Radiometer [MASR] antenna feasibility study. Volume 3: Antenna feasibility
[NASA-CR-156825] N78-33646
MICROWAVE EMISSION
Effect of surface roughness on the microwave emission from soils
[NASA-TM-79606] N78-33284
Remote sensing of rain over the ocean
[NASA-CR-156843] N78-33513
MICROWAVE EQUIPMENT
Microwave acoustic and bulk device technique studies
[AD-A057256] N78-33348
Ferrite microwave electronics, volume 3. A bibliography with abstracts
[NTIS/PS-78/0738/1] N78-33363
MICROWAVE FREQUENCIES
The present situation and forecasts of semiconductor elements performance within the microwave range, 1970-1985
[NASA-TM-75453] N78-33338
MICROWAVE RADIOMETERS
Geosynchronous Microwave Atmospheric Sounding Radiometer [MASR] antenna feasibility study. Volume 3: Antenna feasibility
[NASA-CR-156825] N78-33646
MICROWAVE SCANNING BEAM LANDING SYSTEM
TRSB microwave landing system demonstration program at Shiraz, Iran
[AD-A055526] N78-33071
MICROWAVE TRANSMISSION
Cost effective GaAs Read IMPATT transmitters
[AD-A056996] N78-33352
MICROWAVES
Use of microwave energy in conjunction with fluidized bed reactors
[CONF-771125-3] N78-33588
Compilation and assessment of microwave bioeffects, AO-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system
[PNL-2634] N78-33720
Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation
[JPRS-71910] N78-33727
Cellular and molecular effects and the mechanism of action of microwave electromagnetic fields on biological systems
N78-33728
MIDAIR COLLISIONS
Annual review of aircraft accident data, US general aviation, calendar year 1976
[PB-281330/1] N78-33064
MIE SCATTERING
Mie theory for non spherical particles
[AD-A056435] N78-33305
MILITARY OPERATIONS
Wing planform geometry effects on large subsonic military transport airplanes
[AD-A056124] N78-33088
An investigation of the possible uses of the normal mode helical antenna in the tactical army
[AD-A056324] N78-33314
Geographic data display
[AD-A056101] N78-33514
MILITARY TECHNOLOGY
Unstable resonators for Army laser designators
[AD-A056432] N78-33430
MILLIMETER WAVES
Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation
[JPRS-71910] N78-33727
Biomedical effects of millimeter radio waves
N78-33729
MINERAL DEPOSITS
Table of field numbers, localities, and descriptions of source materials for monazite-bearing concentrates from the Southeastern Atlantic States
[PB-281684/1] N78-33669
MINERALOGY
Relationships of clay mineralogy to landscape stability in Western Oregon
N78-33500
The petrology of two late pliocene bentonites and the enclosing rocks, upper Siwalik Subgroup, northern Punjab and southwestern Kashmir, Pakistan
N78-33641
MINERALS
Infrared spectra of lunar soil analogs --- spectral reflectance of minerals
[NASA-CR-157742] N78-34020
MINES [EXCAVATIONS]
Projects to expand fuel sources in Eastern states: An update of Information Circular 8725. Survey of Planned or proposed coal mines, coal and noncoal conversion plants, electric generating plants, oil refineries, uranium enrichment facilities, and related infrastructure, in states east of the Mississippi River [as of July 1977]
[BM-IC-8765] N78-33581
MINICOMPUTERS
Solid State Data Acquisition and Processing System [SSDAPS]. Volume 3: Description, installation, calibration, and operating procedures --- for vehicle dynamics studies
[PB-282402/7] N78-33125
Computer science and technology: The design and implementation of the National Bureau of Standards' Network Access Machine [NAM]
[PB-282510/7] N78-33762
MIRRORS
LASL laser mirror program: Excerpts from 1/-12 Development Division
[Y-DA-7591] N78-33436
Lightweight laser mirror structural studies
[Y-DA-7472] N78-33437
Plasma surface interactions in Q-enhanced mirror systems
[UCRL-80656] N78-33944
MISSILE CONFIGURATIONS
Missile aerodynamic parameter and structure identification from flight test data
[AD-A056343] N78-33055
Nonlinear rolling motion analysis of a Canard-controlled missile configuration at angles of attack from 0 to 30 degrees in incompressible flow
[AD-A056695] N78-33132
MISSILE SYSTEMS
Encyclopedia of US Air Force aircraft and missile systems. Volume 1: Post-World War II fighters 1945 - 1973
[AD-A057002] N78-33036
MISSILES
Studies of impact-induced responses of a generic crushable-rigid rodlike missile against rigid and deformable targets
[ASRL-TR-190-1] N78-33454
MISSION PLANNING
Pioneer Jupiter orbiter probe mission 1980, probe description
[NASA-CR-137591] N78-33127
MIXTURES
Microstructurally developed toughening mechanisms in ceramics. Fracture toughness of Si3N4 as a function of the initial alpha-phase content
[AD-A057241] N78-33233
Analytical studies of steady and non-steady motions of a bubbly liquid
N78-33375
MODES
Analysis of off-guideway energy storage/propulsion systems for dual mode transit systems
[UCRL-80874] N78-33589
MODULUS OF ELASTICITY
High temperature, noncontact material testing --- ultrasonic tests of elastic materials using pulsed lasers
[UCRL-80438] N78-33212
Brillouin scattering from tungsten bronze materials
N78-33955
MOISTURE CONTENT
Moisture diffusion in fiber reinforced composites --- graphite-epoxy composites
[AD-A056557] N78-33154
MOLECULAR EXCITATION
High efficiency collision-induced dissociation in an RF-only quadrupole
[AD-A057201] N78-33171
Sub-part-per-trillion detection of organics in aqueous solution by laser induced molecular fluorescence
[UCRL-80038] N78-33174
MOLECULAR IONS
Binary positive ion-negative ion mutual neutralization reactions
[AD-A056649] N78-33166
MOLECULAR STRUCTURE
Extended fine structure above vanadium L-shell appearance potential thresholds
[AD-A057141] N78-33203
MOLECULAR WEIGHT
Thermal and molecular effects on solid state behavior of rigid poly[vinylchloride]
N78-33227
MOLECULES
Cellular and molecular effects and the mechanism of action of microwave electromagnetic fields on biological systems
N78-33728
MOLTEN SALTS
Lithium-boron alloy anodes for molten salt batteries [2]
[AD-A057258] N78-33544
MOLYBDENUM ALLOYS
Study of the effects of several variables on the thermal conductivity of 2 1/4 Cr-1 Mo steel
[ORNL-5313] N78-33219
Cleavage behavior as a function of composition for single crystals of the Mo-Nb system
[COO-3476-15] N78-33972
MOM [SEMICONDUCTORS]
Thin-film metal-oxide-metal junction devices
N78-33953
MOMENT DISTRIBUTION
Fragmentation of relativistic light nuclei: Longitudinal and transverse momentum distributions
N78-33902
MONAZITE SANDS
Table of field numbers, localities, and descriptions of source materials for monazite-bearing concentrates from the Southeastern Atlantic States
[PB-281684/1] N78-33669
MONOIDS
Automorphism groups of free algebras and direct powers
N78-33825
MONOPOLE ANTENNAS
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 1: Report proper
[AD-A056702] N78-33077
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 2: Data sheets
[AD-A056629] N78-33078
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 3: Test plan for base impedance
[AD-A056685] N78-33079
OMEGA Norway antenna system characteristics. Modification and validation tests. Volume 4: Test plan for field intensity measurements
[AD-A056631] N78-33080
MONOTONE FUNCTIONS
Monotone steady-state potential distributions in the standard collisionless plane diode model of the single-ended Q-machine --- thermionic converters
[UNICP-FSP-78/1] N78-33931
MORPHOLOGY
The morphology and stability of material phases
N78-33364
MOTION PICTURES
Evolution of an FR-80 generated movie of opposed jet fluid flow
[K/CSD/INF-78/15] N78-33393
MULTICHANNEL COMMUNICATION
Binary sequences for spread-spectrum multiple-access communication
[AD-A056552] N78-33297
Multiple access channels with generalized feedback
N78-33745
MULTIENGINE VEHICLES
The analysis of National Transportation Safety Board small multiengine fixed-wing aircraft accident/incident reports for the potential presence of low-level wind shear
[AD-A056780] N78-33063
MULTIPATH TRANSMISSION
The effect of multipath interference on the performance of a digital matched filter
N78-33329
MULTIPLEXING
B-1 EMUX automated logic diagrammer demonstration program
[AD-A056964] N78-33092
MULTIPROCESSING [COMPUTERS]
An experimental simultaneous multiprocessor organization
N78-33748
Architecture for multiple instruction stream LSI processors
[AD-A056110] N78-33751
A computer hardware design language for multiprocessor systems
[AD-A056111] N78-33794
Hardware scheduling strategies for systems with many processors
N78-33810

MULTISPECTRAL PHOTOGRAPHY
Specification of cloud cover using multispectral satellite radiometric data
[PB-281160/2] N78-33686
Change detection and analysis in multi-spectral images
N78-33746
MULTIVARIATE STATISTICAL ANALYSIS
An analytic study of a minimum chi-2-estimation procedure
N78-33848

N

N-TYPE SEMICONDUCTORS
Ion implantation of wide bandgap semiconductors -- - silicon n-type semiconductors
[AD-A056125] N78-33968
NASA PROGRAMS
Results and status of the NASA aircraft engine emission reduction technology programs
[NASA-TM-79009] N78-33102
NASTRAN
Guide to a condensed form of NASTRAN
[NASA-RP-1019] N78-33791
NATURAL GAS
Benefits derived from the outer continental shelf environmental studies program are questionable
[PB-281782/3] N78-33520
Lower Cook Inlet: Another example of more data needed for appraising outer continental shelf oil and gas resources --- resources management
[PB-281769/0] N78-33521
NATURAL LANGUAGE (COMPUTERS)
A design-interpretation analysis of natural English with applications to man-computer interaction
[AD-A056121] N78-33752
NAVIER-STOKES EQUATION
A numerical study of upstream blocking and internal waves in a density stratified fluid
N78-33370
NAVIGATION SATELLITES
Independent stability and control analysis of navigation development satellites for the global positioning system. Volume 1: Technical report
[AD-A056811] N78-33081
Independent stability and control analysis of navigation development satellites for the global positioning system. Volume 2: Appendixes
[AD-A056812] N78-33082
NEODYMIUM LASERS
Neodymium YAG lasers. A bibliography with abstracts
[NTIS/PS-78/0808/2] N78-33441
NETWORK ANALYSIS
Creation of lumped parameter thermal model by the use of finite elements
[NASA-CR-158944] N78-33479
A network augmenting path basic algorithm for transshipment problems
[AD-A056761] N78-33869
NETWORK SYNTHESIS
Network aggregation in transportation planning. Volume 1: Summary and survey
[PB-281384/8] N78-34011
Network aggregation in transportation planning. Volume 2: A fixed point method for treating traffic equilibria
[PB-281385/5] N78-34012
NEUTRINOS
Observability of the neutrino flux from the inner region of the galactic disk
[NASA-TM-79658] N78-34026
NEWTON THEORY
An extension of Newton's method to systems of equations and inequalities
N78-33832
NEWTON-RAPHSON METHOD
Evaluating strategies for Newton's method using a numerically stable generalized inverse algorithm
N78-33833
NICKEL
Methanation catalysts: Activity, adsorption and degradation studies of nickel and nickel bimetallic catalysts for methanation
N78-33161
A model calculation for the interaction of hydrogen with transition metals: H in Ni
N78-33193
Electrodeposition of nickel onto steel using a soluble mobile anode
[K-1894] N78-33220
AB initio LCAO/MO cluster-type calculation of the self consistent electronic screening charge density around a single hydrogen impurity in a nickel crystal
N78-33963
NICKEL ALLOYS
High temperature cyclic deformation in nickel TD-nickel, and Al-4 percent Cu alloy aged to contain theta prime and theta double prime
N78-33190
Electronic structure of ternary alloys --- iron-nickel-aluminum alloys
[AD-A056356] N78-33198
Thermodynamics of carbon in nickel-based multicomponent solid solutions
[ORNL/TM-6282] N78-33206
Evaluation of cyclic behavior of aircraft turbine disk alloys
[NASA-CR-159433] N78-33478
Impression creep of LiF and Cu-Ni single crystals
N78-33956
NIMBUS PROJECT
A Nimbus G pre-launch field experiment in the Gulf of Mexico, October 1977
[NASA-CR-157786] N78-33509
NIMBUS SATELLITES
A Nimbus G pre-launch field experiment in the Gulf of Mexico, October 1977
[NASA-CR-157786] N78-33509
NIMBUS 5 SATELLITE
Remote sensing of atmospheric water vapor, liquid water and wind speed at the ocean surface by passive microwave techniques from the Nimbus-5 satellite
[NASA-TM-79568] N78-33512
NIMBUS 6 SATELLITE
Remote sounding of cloud compositions from NOAA 4 and Nimbus 6 infrared sounders
[AD-A056852] N78-33683
Specification of cloud cover using multispectral satellite radiometric data
[PB-281160/2] N78-33686
NIOBIUM ALLOYS
Cleavage behavior as a function of composition for single crystals of the Mo-Nb system
[COO-3476-15] N78-33972
NITRATES
Sampling and analytical methodology for atmospheric particulate nitrates
[PB-281933/2] N78-33630
NITROGEN
An experimental study of non-equilibrium free jet expansions of nitrogen
N78-33037
Desorption and surface diffusion: Nitrogen on tungsten [110]
[AD-A056346] N78-33165
Improved detectivity of pyroelectric detectors
[NASA-CR-158917] N78-33406
Growth and characterization of semi-insulating GaN thin films
N78-33954
NITROGEN COMPOUNDS
The nature and formation of nitrogenous air pollutant emissions from combustion systems
N78-33611
NITROGEN DIOXIDE
Effects of nitrogen dioxide on pulmonary function in human subjects
[PB-281186/7] N78-33723
NITROGEN OXIDES
Nitric oxide production in the stratosphere within the Space Shuttle's solid rocket motor plumes
[NASA-TP-1305] N78-33135
NOAA SATELLITES
In-orbit storage of NOAA-NESS standby satellites
[PB-283078/4] N78-33133
NOAA 4 SATELLITE
Remote sounding of cloud compositions from NOAA 4 and Nimbus 6 infrared sounders
[AD-A056852] N78-33683
NOCTURNAL VARIATIONS
The growth and prediction of nocturnal inversions
[AD-A056993] N78-33682
NOISE (SOUND)
Spectral analysis methods for noisy sampled-data systems
N78-33331
NOISE INTENSITY
Comparison of low-frequency noise levels of the Concorde supersonic transport with other commercial service airplanes
[NASA-TM-78736] N78-33873
NOISE MEASUREMENT
Noise-induced building vibrations caused by concorde and conventional aircraft operations at Dulles and Kennedy International Airports
[NASA-TM-78769] N78-33874
NOISE POLLUTION
Environmental noise: The effects of information overload and control over the work environment on performance during and after exposure
N78-33612
Annoyance due to the interaction of community noise sources
N78-33613
Commercial airport operations and community noise criteria
[AD-A057451] N78-33615
Urban noise pollution. A bibliography with abstracts
[NTIS/PS-78/0686/2] N78-33634
NOISE THRESHOLD
The effort of noise exposure on the masking level difference
N78-33709
NONCONSERVATIVE FORCES
Parity nonconservation in the hydrogen atom
N78-33887
NONDESTRUCTIVE TESTS
Acoustic emission testing of composite vessels under sustained loading
[NASA-TM-78981] N78-33150
Feasibility of ultrasonic Rayleigh waves for the detection of corrosion beneath paint
[AD-A056643] N78-33199
Engineering services to determine acceptance limits of ultrasonic transducers for nondestructive inspection
[AD-A056648] N78-33464
Exploratory development of nondestructive evaluation techniques
[AD-A057200] N78-33468
Nondestructive evaluation of steam turbine rotors: An analysis of the systems and techniques utilized for inservice inspection
[EPRI-NP-744] N78-33469
Improved ultrasonic nondestructive testing of pressure vessels
[PB-282170/0] N78-33470
NONEQUILIBRIUM CONDITIONS
An experimental study of non-equilibrium free jet expansions of nitrogen
N78-33037
NONEQUILIBRIUM PLASMAS
An investigation into the energy exchange processes within a nonequilibrium 4 MHz RF helium plasma
N78-33927
NONFLAMMABLE MATERIALS
Effects of ignition sources and fire retardants on material ignition
[PB-281451/5] N78-33184
NONLINEAR EQUATIONS
Analytical studies of steady and non-steady motions of a bubbly liquid
N78-33375
NONLINEAR PROGRAMMING
Evaluating strategies for Newton's method using a numerically stable generalized inverse algorithm
N78-33833
NONLINEAR SYSTEMS
A theory for longitudinal short-period pilot induced oscillations
[AD-A056982] N78-33120
Optimal regulation of nonlinear systems by methods of tensor algebra
N78-33828
The approximation of plane curves by means of circular-arc-based elements
N78-33829
Multidimensional nonlinear Langmuir waves
[AD-A056851] N78-33937
NONLINEARITY
Some formal effects of nonlinearities in optimal perturbation control
N78-33820
NONNEWTONIAN FLUIDS
Transient flow of non-Newtonian power-law fluids in porous media
N78-33374
Drag reducing fluids. A bibliography with abstracts
[NTIS/PS-78/0730/8] N78-33402
NONPARAMETRIC STATISTICS
New nonparametric approach to the two sample problem
[AD-A056706] N78-33862
Techniques of quantile regression
[AD-A056705] N78-33863
NONUNIFORM FLOW
Measurements of energy exchange between acoustic fields and non-uniform steady flow fields
N78-33249
NORMAL DENSITY FUNCTIONS
Climate forecast verification via multinomial stochasters
[AD-A056920] N78-33681
NORTH AMERICA
An analysis of the kinetic energy of two extratropical cyclones
N78-33673
NORTHERN HEMISPHERE
Energetics diagnosis of the NCAR general circulation model
[PB-281140/4] N78-33685
NORWAY
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 1: Report proper
[AD-A056702] N78-33077
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 2: Data sheets
[AD-A056629] N78-33078
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 3: Test plan for base impedance
[AD-A056685] N78-33079
OMEGA Norway antenna system characteristics. Modification and validation tests. Volume 4: Test plan for field intensity measurements
[AD-A056631] N78-33080

NOZZLE GEOMETRY
An experimental study of the cracked nozzle problem occurring in pressure vessels
N78-33471
Room-temperature inelastic test of a nozzle-to-spherical-shell model subjected to pressure and moment loading
[ORNL/TM-6170] N78-33490
NUCLEAR ELECTRIC POWER GENERATION
Nuclear electric power sources
[NASA-TM-78789] N78-33538
NUCLEAR EXPLOSION EFFECT
Calculation of atmospheric composition in the high latitude September stratosphere
[AD-A055160] N78-33656
NUCLEAR EXPLOSIONS
Youngdahl stress functions and quasi-static nonaxisymmetric thermal stresses in a finite cylinder
[AD-A057196] N78-33485
NUCLEAR FUSION
Materials studies for magnetic fusion energy applications at low temperatures, 1
[PB-282444/9] N78-33225
NUCLEAR MAGNETIC RESONANCE
Nuclear magnetic resonance relaxation in aqueous protein systems --- cross relaxation and relaxation time
N78-33155
Experimental and theoretical study of the surface states/surface resonances on the {100} faces of group VIP transition metals
N78-33964
NUCLEAR PUMPED LASERS
Nuclear pumping of a neutral carbon laser
[COO-2007-94] N78-33434
NUCLEAR REACTIONS
Nuclear lifetimes in manganese-52
N78-33905
NUCLEAR SCATTERING
Phonon scattering by dislocations
N78-33949
NUMERICAL ANALYSIS
A theoretical study on oxidative catalytic monoliths --- carbon monoxide oxidation and mass and heat transport
N78-33158
Numerical simulation of two-phase flow in vertical pipes
N78-33366
A numerical study of upstream blocking and internal waves in a density stratified fluid
N78-33370
Numerical methods in fluid flow problems, volume 3. A bibliography with abstracts
[NTIS/PS-78/0823/1] N78-33403
Numerical methods in fluid flow problems, volume 4. A bibliography with abstracts
[NTIS/PS-78/0824/9] N78-33404
An investigation of the orthogonal collocation method with applications to some structural mechanics problems
N78-33476
Dynamic response of a cyclindrical shell immersed in a potential fluid
[UCRL-52464] N78-33493
Functional expansions in bilinear system analysis
N78-33831
NYSTAGMUS
The interaction between the utricles and the semicircular canals during eccentric rotation
N78-33714

O

OBLIQUE SHOCK WAVES
Oblique shock wave/turbulent boundary layer interactions in three dimensions at Mach 3, part 2
[AD-A057010] N78-33056
OCEAN BOTTOM
Acoustic identification of marine sediments by stochastic methods
N78-33695
Meteor ablation spheres from deep-sea sediments
[NASA-TM-78510] N78-34021
OCEAN CURRENTS
GEOS-3 ocean current investigation using radar altimeter profiling --- Gulf Stream surface topography
[NASA-TM-73280] N78-33696
Gulfstream: Monthly publications, January - December 1977. Volume 3, nos. 1 - 12
[PB-283177/4] N78-33698
Gulf Stream. A bibliography with abstracts
[NTIS/PS-78/0844/7] N78-33700
OCEAN MODELS
A large scale ocean-atmosphere interaction model
N78-33675
OCEAN SURFACE
Remote sensing of atmospheric water vapor, liquid water and wind speed at the ocean surface by passive microwave techniques from the Nimbus-5 satellite
[NASA-TM-79568] N78-33512
Remote sensing of rain over the ocean
[NASA-CR-156843] N78-33513
Quantitative mapping by remote sensing of an ocean acid-waste dump
[NASA-TP-1275] N78-33617
GEOS-3 ocean current investigation using radar altimeter profiling --- Gulf Stream surface topography
[NASA-TM-73280] N78-33696
Further studies of sunlight glitter on a wind-ruffled sea --- oil slicks
[AD-A056850] N78-33917
OCEAN THERMAL ENERGY CONVERSION
Catalog information on the performance of aluminum in sea water --- ocean thermal energy conversion
[PNL-2606] N78-33211
OTEC thermal resource report for Hawaii
[TID-27950] N78-33573
Open cycle ocean thermal energy conversion: A preliminary engineering evaluation
[ALO-3723-76/3] N78-33575
OTEC thermal resource report for Puerto Rico
[TID-27953] N78-33593
OFFSHORE ENERGY SOURCES
Benefits derived from the outer continental shelf environmental studies program are questionable
[PB-281782/3] N78-33520
Lower Cook Inlet: Another example of more data needed for appraising outer continental shelf oil and gas resources --- resources management
[PB-281769/0] N78-33521
OIL EXPLORATION
Benefits derived from the outer continental shelf environmental studies program are questionable
[PB-281782/3] N78-33520
Lower Cook Inlet: Another example of more data needed for appraising outer continental shelf oil and gas resources --- resources management
[PB-281769/0] N78-33521
OIL FIELDS
Federal-assistance programs and energy-development-impacted municipalities
[FEA/D-77/039] N78-33549
OIL SLICKS
Further studies of sunlight glitter on a wind-ruffled sea --- oil slicks
[AD-A056850] N78-33917
OMEGA NAVIGATION SYSTEM
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 1: Executive summary
[AD-A056740] N78-33074
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 2: Analysis
[AD-A056741] N78-33075
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirements of CONUS, Alaska, and offshore. Volume 3: Supporting appendices
[AD-A056742] N78-33076
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 1: Report proper
[AD-A056702] N78-33077
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 2: Data sheets
[AD-A056629] N78-33078
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 3: Test plan for base impedance
[AD-A056685] N78-33079
OMEGA Norway antenna system characteristics. Modification and validation tests. Volume 4: Test plan for field intensity measurements
[AD-A056631] N78-33080
OPERATING SYSTEMS [COMPUTERS]
Reference bibliography on operating system design issues for distributed systems [first release]
[AD-A056560] N78-33813
NOS operating system base for Sandia's scientific computer network
[SAND-78-0132] N78-33815
OPERATIONAL HAZARDS
Hazardous material spills: A documentation and analysis of historical data
[PB-281090/1] N78-33631
OPERATIONS RESEARCH
Characteristics of future air cargo demand and impact on aircraft development: A report on the Cargo/Logistic Airlift Systems Study [CLASS] project
[NASA-TM-78774] N78-33061
OPTICAL DATA PROCESSING
Radar processing with baseband hard limiting
N78-33281
On linear operations realizable in coherent optical processor
N78-33910
Performance, evaluation, and specification for coherent optical processors
N78-33911
OPTICAL EQUIPMENT
Functional relationship of angular aberrations for systems with inhomogeneous media
N78-34031
OPTICAL FILTERS
The application of Doubly Stochastic Poisson Process estimation techniques to optical intensity estimation for Gaussian optical fields
N78-33909
OPTICAL MEASUREMENT
Laser far-field beam-profile measurements by the focal plane technique
[PB-281542/1] N78-33438
Plural output optimetric sample cell and analysis system
[NASA-CASE-NPO-10233-1] N78-33913
Optical measurement methods in thermogasdynamics
[NASA-TM-75333] N78-33915
OPTICAL MEASURING INSTRUMENTS
Optical probe --- a rectal probe
[NASA-CASE-NPO-14247-1] N78-33715
OPTICAL PROPERTIES
Research in laser processes
[AD-A056030] N78-33427
Wavelength modulation spectroscopy of semiconductors
N78-33948
Piezo-optic properties of liquids under high pressure
[AD-A055448] N78-33969
Dielectric and optical properties of thin films --- birefrigent coatings
[AD-A056822] N78-33971
Optical and physical properties of evaporated PbS film
[SAND-79-0300] N78-33973
OPTICAL PUMPING
Electron beam pumped vapor phase dye lasers
N78-33423
Anomalous dispersion and the pumping of far infrared [FIR] lasers
[NASA-TM-79596] N78-33424
Nuclear pumping of a neutral carbon laser
[NASA-CR-157728] N78-33435
Optical gain in optically pumped methanol and its application to a FIR preamplifier
N78-33912
OPTICAL RADAR
Applications of polarization-diversity radar and lidar in meteorology
[AD-A056571] N78-33678
OPTICAL RESONATORS
Unstable resonators for Army laser designators
[AD-A056432] N78-33430
OPTICAL SCANNERS
Two-channel high-speed drive for an optical sighting device, operating under conditions of a random moment of load on the output shaft
N78-34030
OPTICAL WAVEGUIDES
Fiber optics, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0713/4] N78-33918
Fiber optics, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0714/2] N78-33919
Fiber optics, volume 2. Citations from the engineering index data base
[NTIS/PS-78/0715/9] N78-33920
Fiber optics, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0716/7] N78-33921
OPTIMAL CONTROL
Optimal branching probabilities and their relationship to computer network file distribution
N78-33809
Optimal joining policies for a queuing system having parallel channels
N78-33817
Some formal effects of nonlinearities in optimal perturbation control
N78-33820
Optimal regulation of nonlinear systems by methods of tensor algebra
N78-33828
Optimal control system design: The predictive sampling problem
N78-33859
OPTIMIZATION
Automation of module set independent register-transfer level design
N78-33332
Optimization algorithms for computer aided design problems
N78-33769
OREGON
Relationships of clay mineralogy to landscape stability in Western Oregon
N78-33500
ORGAN WEIGHT
Biological effects of high strength electric fields on small laboratory animals
[HCP/T1830-03] N78-33706
ORGANIC CHEMISTRY
Sub-part-per-trillion detection of organics in aqueous solution by laser induced molecular fluorescence
[UCRL-80038] N78-33174

ORGANIC LASERS
Dye laser, volume 2. A bibliography with abstracts
[NTIS/PS-78/0872/8] N78-33439
ORGANIC PHOSPHORUS COMPOUNDS
Hydridocyclophosphazenes: Synthesis via organocopper reagents
[AD-A056094] N78-33168
ORGANIC WASTES [FUEL CONVERSION]
Conversion of cellulosic and waste polymer material to gasoline
[COO-2982-21] N78-33257
ORGANOMETALLIC COMPOUNDS
Hydridocyclophosphazenes: Synthesis via organocopper reagents
[AD-A056094] N78-33168
ORGANS
Quantitative organ visualization
N78-33708
ORTHOGONAL FUNCTIONS
An investigation of the orthogonal collocation method with applications to some structural mechanics problems
N78-33476
ORTHOTROPIC PLATES
Analysis of elastic behavior of orthotropic wood composite plates
N78-33145
OSO-8
X ray spectra of X Per --- oso-8 observations
[NASA-TM-79646] N78-34013
OXIDATION
A theoretical study on oxidative catalytic monoliths --- carbon monoxide oxidation and mass and heat transport
N78-33158
Early stages of the oxidation of metal surfaces --- photoelectron spectroscopy of zinc oxide
[NASA-CR-157767] N78-33195
Microstructurally developed toughening mechanisms in ceramics. Compressive surface stresses developed in ceramics by an oxidation-induced phase change
[AD-A057242] N78-33234
OXIDATION-REDUCTION REACTIONS
Degradation studies of a trimethylolpropane triheptanoate lubricant basestock
[AD-A056825] N78-33237
OXIDE FILMS
Influence of dispersed refractory oxides in retarding catalyst sintering
[EPRI-EM-624] N78-33214
OXYGEN
Microprobe method for studying gas-liquid oxygen transfer in various surfactant systems
N78-33160
Fast reactions of aluminum: A literature review
[AD-A057215] N78-33433
The effect of dissolved oxygen concentration activated sludge process performance
N78-34002
OXYGEN ATOMS
The elastic and inelastic scattering of alpha particles by oxygen-16
N78-33906
OXYGENATION
Hyperbaric oxygenation. A bibliography with abstracts
[NTIS/PS-78/0676/3] N78-33724
OZONOMETRY
Ozone concentration in the cabin of a Gates Learjet measured simultaneously with atmospheric ozone concentrations
[NASA-TP-1340] N78-33618

P

P-N-P-N JUNCTIONS
Nuclear electric power sources
[NASA-TM-78789] N78-33538
PACIFIC OCEAN
Annual and seasonal maps of the residual temperature in the upper waters of the western North Pacific from 1954 - 1974
[PB-281212/1] N78-33699
PAINTS
Feasibility of ultrasonic Rayleigh waves for the detection of corrosion beneath paint
[AD-A056643] N78-33199
PAKISTAN
The petrology of two late pliocene bentonites and the enclosing rocks, upper Siwalik Subgroup, northern Punjab and southwestern Kashmir, Pakistan
N78-33641
PARABOLIC ANTENNAS
Minimum antenna dimensions for satellite-communication earth stations
[PB-282109/8] N78-33324
Telescoping columns --- parabolic antenna support
[NASA-CASE-LAR-12195-1] N78-33446
PARACHUTE DESCENT
From space on a parachute
[NASA-TM-75577] N78-33140
PARALLEL COMPUTERS
Analysis of parallel system design using context-free grammars
N78-33771
PARALLEL PROCESSING [COMPUTERS]
System design of parallel microprocessors for solving partial differential equations
N78-33747
PARALLEL PROGRAMMING
Study of a class of parallel programs
N78-33772
Optimal joining policies for a queuing system having parallel channels
N78-33817
PARITY
Parity nonconservation in the hydrogen atom
N78-33887
PARTIAL DIFFERENTIAL EQUATIONS
System design of parallel microprocessors for solving partial differential equations
N78-33747
PARTICLE ACCELERATION
Particle acceleration in pulsar magnetospheres
[NASA-CR-157768] N78-34015
PARTICLE ACCELERATORS
Proceedings of the Second International Topical Conference on High Power Electron and Ion Beam Research and Technology, volume 1
[AD-A057218] N78-33896
PARTICLE DENSITY [CONCENTRATION]
The estimation of air concentrations due to the diffusion, deposition and resuspension of contaminants by the wind
N78-33674
PARTICLE EMISSION
Results and status of the NASA aircraft engine emission reduction technology programs
[NASA-TM-79009] N78-33102
Non-extractive electro-optical measurement of jet-engine emissions
[AD-A056783] N78-33105
PARTICLE INTERACTIONS
Heat pulse propagation characteristics in N-type In As
[AD-A057243] N78-33970
PARTICLE SIZE DISTRIBUTION
A distribution model for the aerial application of granular agricultural particles
[NASA-CR-157745] N78-33048
Determination of particle size using measurement of scatter
[NASA-CR-157741] N78-33914
PARTICLES
Mie theory for non spherical particles
[AD-A056435] N78-33305
PARTICULATE SAMPLING
Turbine engine particulate emission characterization, phase 2
[AD-A057370] N78-33106
Sampling and analytical methodology for atmospheric particulate nitrates
[PB-281933/2] N78-33630
PATHS
The dynamical halo and the variation of cosmic-ray path length with energy
[NASA-TM-79647] N78-34027
PATTERN RECOGNITION
Detection and location of reseaux using pictorial pattern recognition
N78-33502
Feature extraction in an adaptive multiclass pattern recognition system
N78-33818
A methodology for nonlinear feature extraction in statistical pattern recognition
N78-33819
Algorithms and hardware technology for image recognition
[AD-A057191] N78-33821
Clustering and classification of discrete data
N78-33846
PAYLOADS
Prospects for a civil/military transport aircraft
[NASA-TM-78724] N78-33060
Preliminary design characteristics of a subsonic business jet concept employing laminar flow control
[NASA-CR-158958] N78-33087
Station keeping of the space shuttle in the vicinity of a deployed payload
[AD-A056109] N78-33136
PENNSYLVANIA
A study of the Tyrone-Mount Union lineament by remote sensing techniques and field methods
[E78-10155] N78-33505
PERFORMANCE PREDICTION
Mechanization of blended A sub N mode for CCV YF-16
[AD-A056553] N78-33089
The practical impact of elastohydrodynamic lubrication
[NASA-TM-78987] N78-33445
Performance characteristics of automotive engines in the United States. Second series, Report No. 1: 1976 Chevrolet Vega 140 [CID [2.3 liters], 2V --- to determine fuel consumption and emissions
[PB-281774/0] N78-33455
Performance characteristics of automotive engines in the United States. Second series, report no. 2: 1976 Chevrolet 305 CID [5.0 liters], 2V --- to determine fuel consumption and emissions
[PB-281775/7] N78-33456
Performance characteristics of automotive engines in the United States. Second series, report no. 3: 1977 Chrysler 225 CID [3.7 liters], 2V --- to determine fuel consumption and emissions
[PB-281776/5] N78-33457
Performance characteristics of automotive engines in the United States. First series, report no. 12: 1975 Perkins diesel 247 CID [4.0 liters], FI --- to determine fuel consumption and emissions
[PB-281777/3] N78-33458
Performance characteristics of automotive engines in the United States. First series, report no. 13: 1975 American Motors, 258 CID [4.2 liters], 1V --- to determine fuel consumption and emissions
[PB-281778/1] N78-33459
Prediction, evaluation, and specification of closed loop and multiaxis flying qualities
[AD-A056983] N78-33736
Optimal control system design: The predictive sampling problem
N78-33859
Hierarchical analysis of systems
N78-33865
PERFORMANCE TESTS
Aircraft defogging and defrosting [transparent area]
[AD-A056976] N78-33094
Operational testing of Air Force systems requires several improvements
[PB-281796/3] N78-33129
A technique for assessing the durability of structural adhesives
[AD-A057197] N78-33235
Development and fabrication of a concentrating solar collector subsystem
[NASA-CR-150787] N78-33529
Lead batteries. Citations from the NTIS data base
[NTIS/PS-78/0689/6] N78-33605
Vehicle integration and evaluation of advanced restraint systems. Restraint system analysis report
[PB-281475/4] N78-33744
PERIODICALS
Science on its way to work: Activities of the National Bureau of Standards
[PB-282044/7] N78-34000
PERSONNEL MANAGEMENT
National Computer Center personnel management information system design requirements specification. Volume 1: Design requirements and data dictionary
[PB-282589/1] N78-33981
National Computer Center personnel management information system design requirements specification. Volume 2: Report index and formats
[PB-282590/9] N78-33982
PERSPIRATION
Relationship between osmotic pressure of the blood and secretion of sweat
[NASA-TM-75461] N78-33703
PERTURBATION THEORY
Some formal effects of nonlinearities in optimal perturbation control
N78-33820
PETROLOGY
The petrology of two late pliocene bentonites and the enclosing rocks, upper Siwalik Subgroup, northern Punjab and southwestern Kashmir, Pakistan
N78-33641
PH
Forced-flow chromatographic determination of calcium and magnesium with continuous spectrophotometric detection
[IS-T-806] N78-33179
PHARMACOLOGY
Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 2
[AD-A056312] N78-33719
PHASE ERROR
On the detection of anomalous phase errors
N78-33067
PHASE TRANSFORMATIONS
An investigation of phase change problems: A: Melting of a semi-transparent medium including radiation effects; B: Transient freezing of turbulent flow inside tubes
N78-33368
PHASE VELOCITY
The phase of the cross polarized signal generated by millimeter wave propagation through rain
[NASA-CR-156841] N78-33288
PHASED ARRAYS
Phased array antenna amplifier exploratory development model [100 watts]
[AD-A056173] N78-33301

PHOENIX [AZ]
Phoenix House: Solar-assisted heat pump system evaluation
[EPRI-ER-712] N78-33574
PHONON BEAMS
Phonon thermal transport metallic glasses below 100 K
[COO-1198-1205] N78-33239
An analog FFT beamformer for acoustic applications
[AD-A057057] N78-33879
PHONONS
Phonon scattering by dislocations
N78-33949
PHOSPHATES
The hydrothermal synthesis and crystal growth of hydroxyphosphates
N78-33947
PHOSPHORIC ACID
Catalyst sintering studies --- phosphoric acid fuel cells
[EPRI-EM-661] N78-33577
PHOTOCONDUCTIVE CELLS
Plural output optimetric sample cell and analysis system
[NASA-CASE-NPO-10233-1] N78-33913
PHOTOCONDUCTORS
Dielectric and optical properties of thin films --- birefrigent coatings
[AD-A056822] N78-33971
PHOTODISSOCIATION
Photodissociation cross sections for Ar sub 2+, Kr sub 2+, and Xe sub 2+ at 3.0 and 3.5 eV
[AD-A057195] N78-33170
Time-resolved production and detection of reactive atoms
N78-33895
PHOTOELASTICITY
An experimental study of the cracked nozzle problem occurring in pressure vessels
N78-33471
PHOTOELECTRIC EMISSION
Early stages of the oxidation of metal surfaces --- photoelectron spectroscopy of zinc oxide
[NASA-CR-157767] N78-33195
PHOTOELECTRON SPECTROSCOPY
Early stages of the oxidation of metal surfaces --- photoelectron spectroscopy of zinc oxide
[NASA-CR-157767] N78-33195
PHOTOGRAPHIC RECORDING
A photographic technique to obtain droplet and flow pattern data in two-phase flow for use in modeling
N78-33371
PHOTOIONIZATION
The design and operation of an automated, high-efficiency photoionization mass spectrometer
[AD-A056269] N78-33412
Time-resolved production and detection of reactive atoms
N78-33895
PHOTOMAPPING
Mapping ultramafic rocks by computer analysis of digital LANDSAT data
N78-33504
PHOTOMETERS
Fiber-optic time domain reflectometer
[LA-UR-78-824] N78-33415
PHOTOMETRY
Application of photometric analyses for interpretation of Mars-Mariner VI and VII imagery
[NASA-CR-157757] N78-34019
PHOTONS
Information theoretic analysis of multiphoton excitation and collisional deactivation in polyatomic molecules
[COO-2793-11] N78-33899
PHOTOSYNTHESIS
Photoproduction of hydrogen by marine blue-green algae
[PB-280995/2] N78-33264
PHOTOVOLTAIC CELLS
Module/array interface study
[NASA-CR-157774] N78-33533
Evaluation available encapsulation materials for low-cost long-life silicon photovoltaic arrays
[NASA-CR-157758] N78-33535
Amorphous semiconductors in photovoltaic and solar thermal conversion
[BNL-24216] N78-33584
Design of CPC photovoltaic solar collectors
[CONF-780114-8] N78-33585
PHOTOVOLTAIC CONVERSION
Cu/sub x/S-[Cd, Zn]S photovoltaic solar energy converters
[HCP/T7405-1] N78-33582
PHYSICAL SCIENCES
Translations on USSR science and technology: Physical sciences and technology, no. 49
[JPRS-71896] N78-34028
PHYSIOLOGICAL EFFECTS
Volume-restricted freezing of living cells and tissues
[ORNL/MIT-265] N78-33705
PHYSIOLOGICAL RESPONSES
Physical mechanisms for biological effects of ultrasound
[PB-282234/4] N78-33725
PIEZOELECTRICITY
Piezo-optic properties of liquids under high pressure
[AD-A055448] N78-33969
PILOT PERFORMANCE
A theory for longitudinal short-period pilot induced oscillations
[AD-A056982] N78-33120
Adaptation of time line analysis program to single pilot instrument flight research
[NASA-TM-78748] N78-33731
Prediction, evaluation, and specification of closed loop and multiaxis flying qualities
[AD-A056983] N78-33736
Visual performance/workload of helicopter pilots during instrument flight
[AD-A055424] N78-33738
PINCH EFFECT
Time dependent electron and ion flow in pinched beam diodes
[AD-A056362] N78-33908
PIONEER SPACE PROBES
Pioneer Jupiter orbiter probe mission 1980, probe description
[NASA-CR-137591] N78-33127
PIPE FLOW
Formation of iron carbonyl between a 1/2% Mo steel and high-pressure gases containing carbon monoxide
[ORNL-5410] N78-33215
Measurement and analysis of flow in ducts and rod bundles
N78-33377
PIPELINES
Land use planning issues and the Alaska gas pipeline: A report to the President
[PB-281327/7] N78-33522
PIPES [TUBES]
Numerical simulation of two-phase flow in vertical pipes
N78-33366
An investigation of phase change problems: A: Melting of a semi-transparent medium including radiation effects; B: Transient freezing of turbulent flow inside tubes
N78-33368
Extended development of variable conductance heat pipes
[NASA-CR-152183] N78-33379
Development of a cryogenic rotating heat pipe joint
[NASA-CR-152188] N78-33384
PISTON ENGINES
Analysis of a high speed ring valve system for a single cylinder reciprocating compressor
N78-33442
PITCH [INCLINATION]
A theory for longitudinal short-period pilot induced oscillations
[AD-A056982] N78-33120
PITOT TUBES
Axisymmetric air jet impinging on a hemispherical concave plate
N78-33039
PLANE WAVES
Technique for measurements of plane waves of uniaxial strain
[SAND-77-0199C] N78-33494
PLANETARY ATMOSPHERES
Escape of gases from planetary atmospheres
N78-34018
PLANETARY RADIATION
Radiophysical investigations of Venus from spacecraft --- radio emission from Venus and the Sun
[NASA-TM-75578] N78-34017
PLASMA CONDUCTIVITY
Two problems involving imperfect conductivity in a collisionless plasma
N78-33929
PLASMA CONTROL
Multiple stage optimal control problems with applications to plasma heating by neutral injection
[AD-A056856] N78-33935
High beta capture and mirror confinement of laser produced plasmas --- electron cyclotron resonance heating
[COO-2277-10] N78-33946
PLASMA DENSITY
An investigation into the energy exchange processes within a nonequilibrium 4 MHz RF helium plasma
N78-33927
PLASMA HEATING
Multiple stage optimal control problems with applications to plasma heating by neutral injection
[AD-A056856] N78-33935
PLASMA POWER SOURCES
Development and characterization of miniature inductively coupled plasma source for atomic emission spectrometry
[AD-A056139] N78-33932
PLASMA WAVES
Excitation of large amplitude plasma waves by runaway electrons --- tokamak devices
[AD-A056788] N78-33934
Stimulated Raman scattering involving two plasma waves
[AD-A056855] N78-33936
Multidimensional nonlinear Langmuir waves
[AD-A056851] N78-33937
Nonlinear Landau damping in mirror plasmas
[SAI-78-529-LJ] N78-33941
PLASMA-PARTICLE INTERACTIONS
Excitation of large amplitude plasma waves by runaway electrons --- tokamak devices
[AD-A056788] N78-33934
PLASMAS [PHYSICS]
Effect of a dc electric field on beam trapping
[AD-A056789] N78-33354
Modulated electron beam heating of a contact ionized lithium plasma in a mirror machine
N78-33924
Anomalous transport coefficients due to the ion-ion two-stream plasma microinstability
[AD-A056542] N78-33930
The behavior of gridded spherical and planar electron probes in a non-Maxwellian plasma
[AD-A056961] N78-33933
Plasma surface interactions in Q-enhanced mirror systems
[UCRL-80656] N78-33944
PLASTIC DEFORMATION
Strain enhanced spheroidization and superplastic flow in a lead-tin eutectic alloy, part A. Development of a phenomenological equation for superplastic flow of fine grained materials, part B
N78-33188
Metal deformation modeling: Stress relaxation of aluminum
[SAND-78-0164C] N78-33209
Effect of hydrostatic pressure on the deformation behavior of polyethylene and polycarbonate in tension and in compression
[AD-A056786] N78-33236
Computer simulation of plastic deformation in the Charpy V-notch impact test
[UCRL-80868] N78-33491
PLASTIC FLOW
Strain enhanced spheroidization and superplastic flow in a lead-tin eutectic alloy, part A. Development of a phenomenological equation for superplastic flow of fine grained materials, part B
N78-33188
PLASTIC PROPERTIES
Crack tip plasticity associated with corrosion-assisted fatigue --- carbon steels
[AD-A056860] N78-33487
PLASTICS
Assessment of industrial hazardous waste practices, rubber and plastics industry: Executive summary
[PB-282070/2] N78-33270
Assessment of industrial hazardous waste practices, rubber and plastics industry: Plastic materials and synthetics industry
[PB-282071/0] N78-33271
Assessment of industrial hazardous waste practices, rubber and plastics industry: Appendices
[PB-282073/6] N78-33273
Physically-based internal variable model for rate-dependent plasticity
[SAND-78-0181C] N78-33495
PLATINUM
Temperature dependence of hydrogen sputtering of carbon coatings on platinum
[GA-A-14608] N78-33221
Catalyst sintering studies --- phosphoric acid fuel cells
[EPRI-EM-661] N78-33577
PLUMES
Development of base pressure similarity parameters for application to space shuttle launch vehicle power-on aerodynamic testing
[NASA-CR-150826] N78-33134
User's guide for PAL A Guassian-plume algorithm for point, area, and line sources
[PB-281306/1] N78-33627
POINT SOURCES
User's guide for PAL A Guassian-plume algorithm for point, area, and line sources
[PB-281306/1] N78-33627
Inventory of combustion-related emissions from stationary sources
[PB-282428/2] N78-33638
POLAR REGIONS
Some properties of high latitude sporadic E
[REPT-29] N78-33651
High-latitude ionospheric studies in Finland
[REPT-25] N78-33652
Calculation of atmospheric composition in the high latitude September stratosphere
[AD-A055160] N78-33656
POLARIMETERS
A four-channel polarimeter to measure nanosecond laser pulses --- Stokes law of radiation
[AD-A056423] N78-33431

POLARIZATION [SPIN ALIGNMENT]
Performance evaluation of simple HF antenna systems
[AD-A057255] N78-33310
Electron-spin polarization in low energy electron diffraction from tungsten [001]
N78-33960
POLARIZATION CHARACTERISTICS
A four-channel polarimeter to measure nanosecond laser pulses --- Stokes law of radiation
[AD-A056423] N78-33431
POLICIES
Legislatures and information systems. An overview and analysis of recent experience --- using computers for policy making in state government
[PB-282050/4] N78-33993
Legislatures and information systems: Challenges and responses in the states
[PB-282051/2] N78-33994
POLLUTION CONTROL
Pollution Reduction Technology Program for small jet aircraft engines, phase 2
[NASA-CR-159415] N78-33104
A pollution abatement concept, reclamation of Naval Air Rework Facilities waste solvent, phase 1
[AD-A055469] N78-33619
California air pollution control laws --- health and safety code
[PB-281786/4] N78-33632
Symposium proceedings: Environmental aspects of fuel conversion technology, 3
[PB-282429/0] N78-33636
Survey of environmental regulations applying to geothermal exploration, development, and use
[PB-281023/2] N78-33672
POLLUTION MONITORING
Advances in alpha air monitoring instrumentation
[LA-UR-78-1150] N78-33623
Sampling and analytical methodology for atmospheric particulate nitrates
[PB-281933/2] N78-33630
Rapid techniques for calculating the Pollution Standards Index [PSI]
[PB-282028/0] N78-33635
Biological water quality monitoring using chemiluminescent and bioluminescent techniques
[NASA-CR-156830] N78-33702
POLYATOMIC MOLECULES
Information theoretic analysis of multiphoton excitation and collisional deactivation in polyatomic molecules
[COO-2793-11] N78-33899
POLYCARBONATES
Effect of hydrostatic pressure on the deformation behavior of polyethylene and polycarbonate in tension and in compression
[AD-A056786] N78-33236
The yield locus as a function of temperature for oriented and unoriented polycarbonate and polypropylene
N78-33473
POLYETHYLENES
Effect of hydrostatic pressure on the deformation behavior of polyethylene and polycarbonate in tension and in compression
[AD-A056786] N78-33236
POLYIMIDE RESINS
Feasibility demonstration for electroplating ultra-thin polyimide film --- fabricating film for space erectable structures
[NASA-CR-157775] N78-33266
Analysis of graphite/polyimide rail shear specimens subjected to mechanical and thermal loading
[NASA-CR-157769] N78-33481
POLYIMIDES
Development of graphite/polyimide honeycomb core materials
[NASA-CR-158921] N78-33148
POLYMERIC FILMS
Ion beam sputtering of fluoropolymers --- etching polymer films and target surfaces
[NASA-TM-79000] N78-33151
Feasibility demonstration for electroplating ultra-thin polyimide film --- fabricating film for space erectable structures
[NASA-CR-157775] N78-33266
POLYMERIZATION
Effect of ultrasonic waves on the kinetics of polymerization
N78-33226
Polycarboranes. A bibliography with abstracts
[NTIS/PS-78/0865/2] N78-33246
Polycarbonates: Properties, synthesis, and applications. A bibliography with abstracts
[NTIS/PS-78/0754/8] N78-33247
The yield locus as a function of temperature for oriented and unoriented polycarbonate and polypropylene
N78-33473
POLYMERS
Conversion of cellulosic and waste polymer material to gasoline
[COO-2982-21] N78-33257
POLYPROPYLENE
The yield locus as a function of temperature for oriented and unoriented polycarbonate and polypropylene
N78-33473
POLYSTYRENE
Streaming birefringence in extensional flow of polymer solutions
N78-33365
POLYVINYL CHLORIDE
Thermal and molecular effects on solid state behavior of rigid poly[vinylchloride]
N78-33227
POPULATION THEORY
Maximum modified likelihood estimation of population size
N78-33858
POROSITY
Dynamic characterization of poroelastic materials
N78-33147
Pore shrinkage and Ostwald ripening in metallic systems
[COO-4385-2] N78-33222
POROUS MATERIALS
Transient and failure analyses of porous zinc electrodes
N78-33187
PORTABLE EQUIPMENT
Communications for a mobile society: An assessment of new technology
[PB-281639/5] N78-33319
Unstable resonator retrofitted handheld laser designator
[AD-A057248] N78-33432
Portability techniques for BLISS programs
[AD-A056066] N78-33795
POSITRONS
Theoretical study of the differential positronium cross section with helium and argon targets
N78-33893
POSTFLIGHT ANALYSIS
PLACE: Post LANDSAT D Advanced Concept Evaluation
[E78-10156] N78-33506
POSTURE
The lumbosacral segment as a vulnerable region in various postures
[NASA-TM-75579] N78-33713
POTENTIAL ENERGY
Monotone steady-state potential distributions in the standard collisionless plane diode model of the single-ended Q-machine --- thermionic converters
[UNICP-FSP-78/1] N78-33931
POTTING COMPOUNDS
Development of alternate silicone potting compounds. Volume 2: Development of the primary alternate for Dow Corning's aerospace sealant, DC 93-119
[UCRL-52434-VOL-2] N78-33242
Development of alternate silicone potting compounds. Volume 1: Experimental program
[UCRL-52434-VOL-1] N78-33244
POWDER METALLURGY
Evaluation of cyclic behavior of aircraft turbine disk alloys
[NASA-CR-159433] N78-33478
POWER CONDITIONING
The 15kW general purpose power conditioner [frequency changer]. AC-DC section
[AD-A056302] N78-33353
PRANDTL NUMBER
Natural convection in a thermally stratified fluid
N78-33373
PRECIPITATION [CHEMISTRY]
Precipitation kinetics of a continuous precipitator, with application to the precipitation of ammonium polyuranate
N78-33951
PRECIPITATION [METEOROLOGY]
Rain scavenging studies
[COO-1407-65] N78-33676
Development of techniques for short-range precipitation forecasts
[AD-A057153] N78-33680
PRECIPITATION PARTICLE MEASUREMENT
Applications of polarization-diversity radar and lidar in meteorology
[AD-A056571] N78-33678
PREDICTION ANALYSIS TECHNIQUES
Measuring and predicting the dynamic effects of a confined thin metal plate pulse heated into the liquid-vapor regime
N78-33192
Updating of ADAPT predictions of sunspot activity
[NASA-CR-150823] N78-34024
PRESSURE DISTRIBUTION
Measurement of unsteady pressures in rotating systems
[NASA-TM-75445] N78-33042
Design and overall performance of four highly loaded, high speed inlet stages for an advanced high-pressure-ratio core compressor
[NASA-TP-1337] N78-33108
Stability of sparingly soluble monolayers at the air-water interface
N78-33378
PRESSURE EFFECTS
Piezo-optic properties of liquids under high pressure
[AD-A055448] N78-33969
PRESSURE MEASUREMENTS
Measurement of unsteady pressures in rotating systems
[NASA-TM-75445] N78-33042
Static pressure orifice system testing and apparatus
[NASA-CASE-LAR-12269-1] N78-33123
Investigation of HEPA filters subjected to tornado pressure pulses: Initial structural testing
[LA-7202-MS] N78-33394
PRESSURE SENSORS
Comparison of concurrent strain gage- and pressure transducer-measured flight loads on a lifting reentry vehicle and correlation with wind tunnel predictions
[NASA-TP-1331] N78-33053
PRESSURE VESSELS
Acoustic emission testing of composite vessels under sustained loading
[NASA-TM-78981] N78-33150
Heavy-section steel technology program
[ORNL/NUREG/TM-166] N78-33208
Development of a cryogenic rotating heat pipe joint
[NASA-CR-152188] N78-33384
Improved ultrasonic nondestructive testing of pressure vessels
[PB-282170/0] N78-33470
An experimental study of the cracked nozzle problem occurring in pressure vessels
N78-33471
EPRI ductile fracture research review document --- nuclear pressure vessels
[EPRI-NP-701-SR] N78-33489
Stress-rupture life of Kevlar/epoxy spherical pressure vessels
[UCID-17755-PT-1] N78-33492
Residual stresses at weld repairs in pressure vessels
[PB-281853/2] N78-33497
Thermal conversion of oil-shale kerogen using CO and water at elevated pressures
[LERC-78/1] N78-33552
PRIMARY BATTERIES
Sealed primary lithium-inorganic electrolyte cell
[AD-A056370] N78-33543
PRINTED CIRCUITS
Measurements of dimensional and electrical characteristics of printed boards made with IPC Multi-Purpose Test Pattern, B-25
[SAND-77-1837C] N78-33357
Data acquisition systems applied to printed-wiring-board measurements
[SAND-78-8501] N78-33358
PROBABILITY DENSITY FUNCTIONS
An adaptive orthogonal-series estimator for probability density functions
N78-33849
PROBABILITY DISTRIBUTION FUNCTIONS
Climate forecast verification via multinomial stochasters
[AD-A056920] N78-33681
Estimation of the operating characteristics of item response categories 4: Comparison of the different methods
[AD-A057161] N78-33735
PROBABILITY THEORY
Optimal branching probabilities and their relationship to computer network file distribution
N78-33809
Maximum modified likelihood estimation of population size
N78-33858
PROBES
The calibration and application of five-hole probes
[NASA-CR-157735] N78-33387
PROBLEM SOLVING
A discrete ordinates solution of the time-dependent Fokker-Planck equation
N78-33827
An extension of Newton's method to systems of equations and inequalities
N78-33832
Fault trees: Sensitivity of estimated failure probabilities to problem presentation
[AD-A057163] N78-33837
The zonal matching problem
N78-33867
Lattice field theories: Non-perturbative methods of analysis
[SLAC-PUB-2073] N78-33975
PRODUCT DEVELOPMENT
Engineering and development program plan: Discrete Address Beacon System [DABS]
[AD-A057122] N78-33073
Engineering and development program plan: Advanced Integrated Flight Systems [AIFS]
[AD-A056770] N78-33119
Development of high-efficiency cost-effective, zinc-chlorine batteries for utility peak-shaving, 1976
[EPRI-EM-711] N78-33590

PRODUCTION ENGINEERING
Advanced program weight control system
N78-33779
Associative programming language and virtual associative access manager
N78-33781
PRODUCTION MANAGEMENT
Limits to energy conservation in chemical processes
[ORAU/IEA-78-6[M]] N78-33550
Analysis of federal incentives used to stimulate energy production: An executive summary
[PNL-2410] N78-33565
The multi-product production cycling problem --- determining production and inventory control policies
N78-33864
PRODUCTIVITY
The multi-product production cycling problem --- determining production and inventory control policies
N78-33864
PROGRAMMING LANGUAGES
Extensions of AHPL and optimization of the AHPL compiler for MSI/LSI design
N78-33333
Dissemination of the PADL-1.0/n processor: Part and Assembly Description Language [PADL]
[PB-281549/6] N78-33757
Extension mechanisms for high-level programming languages
N78-33775
Associative programming language and virtual associative access manager
N78-33781
A comparison of hardware description languages --- describing digital systems structure and behavior to a computer
[NASA-CR-157762] N78-33788
Automatic generation of code generators --- motivated by programming languages
N78-33790
A computer hardware design language for multiprocessor systems
[AD-A036111] N78-33794
Portability techniques for BLISS programs
[AD-A056066] N78-33795
Structured programming. A bibliography with abstracts
[NTIS/PS-78/0688/8] N78-33806
PROJECT MANAGEMENT
Demonstration project as a procedure for accelerating the application of new technology. Charpie task force report, volume 1
[DOE/RA-0003/1-VOL-1] N78-33563
Demonstration project as a procedure for accelerating the application of new technology. Charpie task force report, volume 2
[DOE/RA-0003/2-VOL-2] N78-33564
PROJECT PLANNING
Environmental Development Plan [EDP]: Energy storage systems, FY 1977
[DOE/EDP-0015] N78-33579
The multiprogram laboratories: A national resource for nonnuclear energy research, development, and demonstration
[PB-281265/9] N78-33607
PROJECTILES
Measurements in the turbulent boundary layer of a yawed, spinning body of revolution at Mach 3.0 with a laser velocimeter and impact probe
[AD-A057237] N78-33059
PROPAGATION MODES
Propagating modes on a buried leaky coaxial cable
[AD-A057253] N78-33308
Excitation of current on an infinite horizontal wire over the earth by an arbitrary electric dipole source
[AD-A057257] N78-33346
PROPANE
Degradation studies of a trimethylolpropane triheptanoate lubricant basestock
[AD-A056825] N78-33237
PROPULSIVE EFFICIENCY
Analysis of off-guideway energy storage/propulsion systems for dual mode transit systems
[UCRL-80874] N78-33589
PROTECTIVE CLOTHING
Anthropometry: Basic studies and applications, volume 2. A bibliography with abstracts
[NTIS/PS-78/0866/0] N78-33726
PROTEINS
Nuclear magnetic resonance relaxation in aqueous protein systems --- cross relaxation and relaxation time
N78-33155
PROTOTYPES
Prototype High Frequency [HF] intercept capability for the tactical airbase weather element [TABWE]
[AD-A055685] N78-33292
PROXIMITY
Comparative studies of the steady state and RF properties of proximity effect bridges
N78-33961
PSYCHOLOGICAL TESTS
Estimation of the operating characteristics of item response categories 4: Comparison of the different methods
[AD-A057161] N78-33735
PSYCHOPHYSICS
Quantitative predictions of length in the Mueller-Lyer illusion as perceived by the human visual system
[AD-A055706] N78-33732
PUBLIC HEALTH
Federal-assistance programs and energy-development-impacted municipalities
[FEA/D-77/039] N78-33549
California air pollution control laws --- health and safety code
[PB-281786/4] N78-33632
PUBLIC LAW
California air pollution control laws --- health and safety code
[PB-281786/4] N78-33632
PUERTO RICO
OTEC thermal resource report for Puerto Rico
[TID-27953] N78-33593
PULMONARY FUNCTIONS
Effects of nitrogen dioxide on pulmonary function in human subjects
[PB-281186/7] N78-33723
PULSARS
X ray spectra of X Per --- oso-8 observations
[NASA-TM-79646] N78-34013
Particle acceleration in pulsar magnetospheres
[NASA-CR-157768] N78-34015
PULSE AMPLITUDE MODULATION
On the detection of anomalous phase errors
N78-33067
PULSE DURATION
A four-channel polarimeter to measure nanosecond laser pulses --- Stokes law of radiation
[AD-A056423] N78-33431
PULSE MODULATION
Programmed-waveform pulse-width modulation techniques for the control of converter harmonics
N78-33335
PULSE RADAR
Terminal radar interference criteria study --- air traffic controller performance
[AD-A057280] N78-33291
PULSE RATE
Unstable resonator retrofitted handheld laser designator
[AD-A057248] N78-33432
PULSE WIDTH AMPLITUDE CONVERTERS
Programmed-waveform pulse-width modulation techniques for the control of converter harmonics
N78-33335
PULSED LASERS
High temperature, noncontact material testing --- ultrasonic tests of elastic materials using pulsed lasers
[UCRL-80438] N78-33212
Experimental determination of single and multiple pulse propagation
[AD-A055570] N78-33426
A four-channel polarimeter to measure nanosecond laser pulses --- Stokes law of radiation
[AD-A056423] N78-33431
Time-resolved production and detection of reactive atoms
N78-33895
PYROELECTRICITY
Improved detectivity of pyroelectric detectors
[NASA-CR-158917] N78-33406
PYROLYSIS
New techniques for the analysis of thermolysis products
N78-33163
PYROTECHNICS
Classification testing of composition A5 and selected pyrotechnics
[NASA-CR-157744] N78-33251

Q

Q DEVICES
Monotone steady-state potential distributions in the standard collisionless plane diode model of the single-ended Q-machine --- thermionic converters
[UNICP-FSP-78/1] N78-33931
QUALITY CONTROL
Data acquisition systems applied to printed-wiring-board measurements
[SAND-78-8501] N78-33358
Engineering services to determine acceptance limits of ultrasonic transducers for nondestructive inspection
[AD-A056648] N78-33464
Construction quality control systems: A comparative analysis
[AD-A056334] N78-33467
Development of a crack growth rate test for quality control
[AD-A056373] N78-33484
QUANTITATIVE ANALYSIS
Separation of metal ions using an o-hydroxypropiophenoxime resin
[IS-T-801] N78-33178
Quantitative mapping by remote sensing of an ocean acid-waste dump
[NASA-TP-1275] N78-33617
QUANTUM ELECTRODYNAMICS
Investigations of resonance fluorescence --- quantum electrodynamics and Heisenberg theory
N78-33892
QUEUEING THEORY
Optimal joining policies for a queuing system having parallel channels
N78-33817

R

RADAR BEACONS
System definition and investigation of the on site processing of en route sensor signals. Addendum: Investigation into possible en route on site beacon ring around discriminants
[AD-A056941] N78-33070
RADAR DATA
Radar processing with baseband hard limiting
N78-33281
RADAR ECHOES
Analysis of stress ionograms
[AD-A056388] N78-33659
RADAR IMAGERY
Preliminary geologic evaluation of L-band radar imagery: Arkansas test site
[NASA-CR-157761] N78-33644
Radar observations of a volcanic terrain: Askja Caldera, Iceland
[NASA-CR-157765] N78-33645
RADAR SIGNATURES
System definition and investigation of the on site processing of en route sensor signals. Addendum: Investigation into possible en route on site beacon ring around discriminants
[AD-A056941] N78-33070
RADAR TARGETS
Identification of periodically amplitude modulated targets
[AD-A056516] N78-33299
Radar target remotely sensing hydrological phenomena
[NASA-CASE-LAR-12344-1] N78-33511
RADIAL FLOW
Kinetic transport properties of a bumpy torus with finite radial ambipolar field
[ORNL/TM-6215] N78-33942
RADIANT COOLING
Cooling rate variations within the group IV A iron meteorites
N78-34016
RADIATION COUNTERS
Experiment definition and integration study for the accommodation of giant, passive detector of Exotic Particles In the Cosmic Rays [EPIC] payload on shuttle/spacelab missions
[NASA-CR-156842] N78-34025
RADIATION DAMAGE
Youngdahl stress functions and quasi-static nonaxisymmetric thermal stresses in a finite cylinder
[AD-A057196] N78-33485
RADIATION DETECTORS
Advances in alpha air monitoring instrumentation
[LA-UR-78-1150] N78-33623
RADIATION DISTRIBUTION
Groundwave propagation and radiation patterns of a vertical electric dipole over a radially varying surface impedance plane
N78-33282
On the nature and distribution of solar radiation --- insolation and earth atmosphere effects
[HCP/T2552-01] N78-33667
Quantitative organ visualization
N78-33708
RADIATION DOSAGE
Fast neutron depth dose distributions in a heterogeneous phantom
N78-33712
Advances in human internal radiation counting at Los Alamos: Multiple simultaneous in-vivo measurements
[LA-UR-78-1063] N78-33721
RADIATION EFFECTS
Effect of radiation and acids on thermal stability of ion exchange resins
[RFP-2652] N78-33238
An investigation of phase change problems: A: Melting of a semi-transparent medium including radiation effects; B: Transient freezing of turbulent flow inside tubes
N78-33368
Physical mechanisms for biological effects of ultrasound
[PB-282234/4] N78-33725
Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation
[JPRS-71910] N78-33727
RADIATION MEASUREMENT
Multifreqency riometer measurements at high latitudes
[REPT-27] N78-33285

RADIATION PROTECTION
The preventive role of ultraviolet radiation during exposure to ionizing radiation
[NASA-TM-75106] N78-33710

RADIATIVE LIFETIME
Laser induced fluorescence in titanium oxide: Lifetimes, collisions, and intercombinations
N78-33925
An investigation of radiative lifetimes and oscillator strengths for allowed intra L-shell transitions in multiply-charged chlorine ions
N78-33958

RADIO ALTIMETERS
GEOS-3 ocean current investigation using radar altimeter profiling --- Gulf Stream surface topography
[NASA-TM-73280] N78-33696

RADIO ATTENUATION
A depolarization and attenuation experiment using the COMSTAR and CTS satellites
[NASA-CR-156848] N78-33287
The onset of an auroral absorption substorm
[REPT-24] N78-33649
Studies of the onset of an auroral absorption substorm
[REPT-26] N78-33650

RADIO COMMUNICATION
Alternatives for future personal radio services, volume 1
[PB-280938/2] N78-33320
Alternatives for future personal radio services, volume 2
[PB-280939/0] N78-33321

RADIO FREQUENCIES
Radio frequency size effect measurements on the Fermi surface of rhenium
N78-33962

RADIO FREQUENCY INTERFERENCE
Electromagnetic radiation analysis
[AD-A056647] N78-33294

RADIO INTERFEROMETERS
An observer's manual for the Air Force swept frequency interferometric radiometer
[AD-A056994] N78-33411

RADIO METEOROLOGY
Prototype High Frequency [HF] intercept capability for the tactical airbase weather element [TABWE]
[AD-A055685] N78-33292

RADIO RELAY SYSTEMS
Multiple-coupled random access techniques for packet radio networks
[AD-A056550] N78-33298
The feasibility of employing frequencies between 20 and 300 GHz for earth-statellite communications links
[AD-A056100] N78-33300
Radio propagation via transponder
[AD-A056899] N78-33306
Minimum antenna dimensions for satellite-communication earth stations
[PB-282109/8] N78-33324

RADIO TRANSMISSION
Radio propagation via transponder
[AD-A056899] N78-33306
High-latitude ionospheric studies in Finland
[REPT-25] N78-33652

RADIO WAVES
Multifreqency riometer measurements at high latitudes
[REPT-27] N78-33285
Biomedical effects of millimeter radio waves
N78-33729
Radiophysical investigations of Venus from spacecraft --- radio emission from Venus and the Sun
[NASA-TM-75578] N78-34017

RADIOACTIVE DECAY
Nuclear lifetimes in manganese-52
N78-33905

RADIOGRAPHY
Exploratory development of nondestructive evaluation techniques
[AD-A057200] N78-33468

RADIOMETERS
An aircraft radiometer front end, addendum
[NASA-CR-157777] N78-33405
Specification of cloud cover using multispectral satellite radiometric data
[PB-281160/2] N78-33686
Application of photometric analyses for interpretation of Mars-Mariner VI and VII imagery
[NASA-CR-157757] N78-34019

RADIOPATHOLOGY
The preventive role of ultraviolet radiation during exposure to ionizing radiation
[NASA-TM-75106] N78-33710

RAIN
Communications Link Characterization Experiment [CLCE] technical data report, volume 2
[NASA-CR-156808] N78-33286
The phase of the crosspolarized signal generated by millimeter wave propagation through rain
[NASA-CR-156841] N78-33288
Remote sensing of rain over the ocean
[NASA-CR-156843] N78-33513
Rain scavenging studies
[COO-1407-65] N78-33676

RAINDROPS
A depolarization and attenuation experiment using the COMSTAR and CTS satellites
[NASA-CR-156848] N78-33287

RAMAN SPECTROSCOPY
Stimulated Raman scattering involving two plasma waves
[AD-A056855] N78-33936

RANDOM NOISE
The effect of multipath interference on the performance of a digital matched filter
N78-33329
Some formal effects of nonlinearities in optimal perturbation control
N78-33820

RANDOM PROCESSES
Optimum fatigue resistant frames for random base excitation
N78-33477
Adaptive stochastic control of linear systems with random parameters
[AD-A056849] N78-33822

RANKING
The Bayesian multiple comparisons problems for uniform distrubutions and for translated exponential distributions
N78-33851

RARE EARTH ELEMENTS
Table of field numbers, localities, and descriptions of source materials for monazite-bearing concentrates from the Southeastern Atlantic States
[PB-281684/1] N78-33669
Atomic energy levels: The rare earth elements [the spectra of lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, ebrium, thulium, ytterbium, and lutetium]
[PB-282067/8] N78-33901

RARE GASES
Photodissociation cross sections for Ar sub 2+, Kr sub 2+, and Xe sub 2+ at 3.0 and 3.5 eV
[AD-A057195] N78-33170
Inert gas welding, volume 2. Citations from the engineering index data base
[NTIS/PS-78/0904-VOL-2] N78-33460
Inert gas welding, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0905/6] N78-33461
Inert gas welding. Citations from the NTIS data base
[NTIS/PS-78/0903/1] N78-33462

RATIOS
Flexible system having two selectable ratios for use with Josephson voltage devices with 2 selectable ratios
[SAND-77-2121C] N78-33356

RATS
Micro-fluid exchange coupling apparatus --- a microrespirator to allow surgery on rats or mice
[NASA-CASE-ARC-11114-1] N78-33717

RAYLEIGH SCATTERING
Rayleigh-Brillouin scattering and structural relaxation of a viscoelastic liquid
[AD-A056763] N78-33389
Raleigh-like reflection of ultrasonic waves at a liquid-solid layer-solid interface
[AD-A056975] N78-33878

RAYLEIGH WAVES
Feasibility of ultrasonic Rayleigh waves for the detection of corrosion beneath paint
[AD-A056643] N78-33199

REACTION
Computational study of physical and chemical flame inhibition
[LBL-6899] N78-33181

REACTION KINETICS
Binary positive ion-negative ion mutual neutralization reactions
[AD-A056649] N78-33166
Kinetics of iron ore reduction
N78-33186
Effect of ultrasonic waves on the kinetics of polymerization
N78-33226
Microstructurally developed toughening mechanisms in ceramics. Compressive surface stresses developed in ceramics by an oxidation-induced phase change
[AD-A057242] N78-33234
Catalytic conversion of solvent refined coal to liquid products
[LBL-6807] N78-33258
Fast reactions of aluminum: A literature review
[AD-A057215] N78-33433

REACTOR DESIGN
A toroidal fusion reactor design based on the reversed-field pinch
N78-33926

REACTOR MATERIALS
EPRI ductile fracture research review document --- nuclear pressure vessels
[EPRI-NP-701-SR] N78-33489

READ-ONLY MEMORY DEVICES
A digital control unit for a rocket borne quadrupole mass spectrometer
[AD-A057251] N78-33141

REAL TIME OPERATION
Vortex advisory system simulation of Chicago O'-Hare Airport
[AD-A057112] N78-33069
Interactive electronic circuit simulation on small computer systems with a real time algorithm for ac analysis
N78-33808

REAL VARIABLES
Shifted incomplete Cholesky factorization --- linear systems and matrix theory
[SAND-78-8226] N78-33841

RECOMBINATION COEFFICIENT
Binary positive ion-negative ion mutual neutralization reactions
[AD-A056649] N78-33166

RECORDING INSTRUMENTS
Conversion from film to magnetic cassette recording for current meter
[AD-A056962] N78-33409
Two lightning-flash counter systems
[AD-A057369] N78-33655

RECORDS
Agencies, implementation of and compliance with the Privacy Act can be improved
[PB-281768/2] N78-33997

RECOVERY
Determination of the recovery stresses developed by shape memory alloys
[LBL-6884] N78-33216

RECTUM
Optical probe --- a rectal probe
[NASA-CASE-NPO-14247-1] N78-33715

RECYCLING
A recycled-water sanitary waste disposal system
N78-34004

REDUCTION [CHEMISTRY]
Kinetics of iron ore reduction
N78-33186

REDUNDANCY ENCODING
Automatic generation of code generators --- motivated by programming languages
N78-33790

REDUNDANT COMPONENTS
Redundant disc
[NASA-CASE-LEW-12496-1] N78-33101

REENTRY VEHICLES
Hardened reentry vehicle development program. Erosion-resistant nosetip technology
[AD-A056390] N78-33128
ABRES pretest atmospheric measurements
[AD-A055285] N78-33657

REFINING
Coal desulfurization
[NASA-CASE-NPO-14272-1] N78-33164
Thermal conversion of oil-shale keroges using CO and water at elevated pressures
[LERC-78/1] N78-33552
Projects to expand fuel sources in Eastern states: An update of Information Circular 8725. Survey of Planned or proposed coal mines, coal and noncoal conversion plants, electric generating plants, oil refineries, uranium earichment facilities, and related infrastructure, in states east of the Mississippi River [as of July 1977]
[BM-IC-8765] N78-33581

REFLECTANCE
Change in reflectivity of a metal surface during intense laser irradiation
N78-33420
Further studies of sunlight glitter on a wind-ruffled sea --- oil slicks
[AD-A056850] N78-33917

REFLECTOMETERS
Fiber-optic time domain reflectometer
[LA-UR-78-824] N78-33415

REFRACTIVITY
Effect of a nonlinear refractive index on Faraday rotation
N78-33903

REGENERATION [ENGINEERING]
A pollution abatement concept, reclamation of Naval Air Rework Facilities waste solvent, phase 1
[AD-A055469] N78-33619

REGIONAL PLANNING
Regional flood analyses and land use planning in an area of inadequate data Santa Cruz County, California
N78-33501
Land use planning issues and the Alaska gas pipeline: A report to the President
[PB-281327/7] N78-33522
Preliminary optimization model for assessment of energy development in the Rocky Mountain region
[LA-6689-MS] N78-33558
Environmental development plan for buildings and community systems, 1977
[DOE/EDP-0020] N78-33622

REGRESSION ANALYSIS
A parameter estimation subroutine package
[NASA-CR-157766] N78-33789
An investigation of a space time clustering problem
N78-33850
A density-quantile function perspective on robust estimation
[AD-A056707] N78-33861

Techniques of quantile regression
[AD-A056705] N78-33863
REGULATIONS
Survey of environmental regulations applying to geothermal exploration, development, and use
[PB-281023/2] N78-33672
REINFORCEMENT [STRUCTURES]
Analysis/design of strip reinforced random composites [strip hybrids]
[NASA-TM-78985] N78-33149
RELATIVISTIC PLASMAS
Equilibrium and nonlocal stability properties of bounded relativistic electron beam-plasma systems
N78-33923
RELATIVISTIC VELOCITY
Fragmentation of relativistic light nuclei: Longitudinal and transverse momentum distributions
N78-33902
RELAXATION [MECHANICS]
Pulsations and expansion of the earth: A possible key to an understanding of its tectonic development and volcanism in the phanerozoic
N78-34033
RELAXATION METHOD [MATHEMATICS]
On block relaxation techniques
[AD-A056749] N78-33754
RELAXATION TIME
Nuclear magnetic resonance relaxation in aqueous protein systems --- cross relaxation and relaxation time
N78-33155
RELIABILITY ANALYSIS
Reliability, availability and maintainability analysis of the AQUILA remotely piloted vehicle system
[AD-A056942] N78-33090
Bayesian reliability analysis of the alpha distributions with applications
N78-33847
RELIABILITY ENGINEERING
The Gini index, the Lorenz curve, and the total time on test transforms
[AD-A056095] N78-33466
REMOTE SENSORS
Radar target remotely sensing hydrological phenomena
[NASA-CASE-LAR-12344-1] N78-33511
Remote sensing of atmospheric water vapor, liquid water and wind speed at the ocean surface by passive microwave techniques from the Nimbus-5 satellite
[NASA-TM-79568] N78-33512
Remote sensing of rain over the ocean
[NASA-CR-156843] N78-33513
Remote sensing applied to hydrology. A bibliography with abstracts
[NTIS/PS-78/0792/8] N78-33523
Quantitative mapping by remote sensing of an ocean acid-waste dump
[NASA-TP-1275] N78-33617
Optical characteristics of the earth's surface and atmosphere from the point of view of the remote sensing of natural resources: Review of the contemporary status of the problem
[NASA-TM-75548] N78-33642
Remote sounding of cloud compositions from NOAA 4 and Nimbus 6 infrared sounders
[AD-A056852] N78-33683
REMOTELY PILOTED VEHICLES
Reliability, availability and maintainability analysis of the AQUILA remotely piloted vehicle system
[AD-A056942] N78-33090
REPORTS
National Computer Center personnel management information system design requirements specification. Volume 2: Report index and formats
[PB-282590/9] N78-33982
RESEARCH AND DEVELOPMENT
Exploratory development of nondestructive evaluation techniques
[AD-A057200] N78-33468
Cooperative research and development and associated government policy
N78-33976
Information transfer and use in chemistry
[BLL-BLRDR-5385] N78-34001
Translations on USSR science and technology: Physical sciences and technology, no. 49
[JPRS-71896] N78-34028
Soviet laser spectroscopy research reviewed
N78-34034
RESEARCH MANAGEMENT
Thermodynamic and transport properties of interstitial hydrogen isotopes in metal systems
[COO-3551-44] N78-33224
Benefits derived from the outer continental shelf environmental studies program are questionable
[PB-281782/3] N78-33520
ERDA facilities: A national resource for resolving energy problems
[ERDA-77-80] N78-33597
The multiprogram laboratories: A national resource for nonnuclear energy research, development, and demonstration
[PB-281265/9] N78-33607
Computer-aided environmental impact analysis for industrial, procurement, and research Development, test, and evaluation activities: User's manual
[AD-A056997] N78-33620
RESEARCH PROJECTS
Hydraulic research in the United States and Canada
[PB-281501/7] N78-33400
Management of atmospheric data
N78-33782
RESIDENTIAL AREAS
Residential space heating cost: Geothermal vs conventional systems
[TREE-1182] N78-33567
Fuel consumption: Industrial, residential, and general studies. Volume 1. A bibliography with abstracts
[NTIS/PS-78/0709/2] N78-33601
Commercial airport operations and community noise criteria
[AD-A057451] N78-33615
RESIDUAL STRESS
Residual stresses at weld repairs in pressure vessels
[PB-281853/2] N78-33457
RESISTANCE
Extended development of variable conductance heat pipes
[NASA-CR-152183] N78-33379
RESISTORS
Thermal degradation and termination behavior of thick film resistors
[SAND-77-1904] N78-33355
RESONANCE
Investigations of resonance fluorescence --- quantum electrodynamics and Heisenberg theory
N78-33892
RESONANT FREQUENCIES
On the radiation damping of high externally resonant electromagnetic systems
[AD-A056316] N78-33317
RESONATORS
On the radiation damping of high externally resonant electromagnetic systems
[AD-A056316] N78-33317
RESOURCE ALLOCATION
Cooperative research and development and associated government policy
N78-33976
RESOURCES MANAGEMENT
Lower Cook Inlet: Another example of more data needed for appraising outer continental shelf oil and gas resources --- resources management
[PB-281769/0] N78-33521
Appraisal of energy analysis
[EPRI-EA-504] N78-33547
RESPIRATORS
Micro-fluid exchange coupling apparatus --- a microrespirator to allow surgery on rats or mice
[NASA-CASE-ARC-11114-1] N78-33717
RESPIRATORY DISEASES
Effects of nitrogen dioxide on pulmonary function in human subjects
[PB-281186/7] N78-33723
RESPONSES
Estimation of the operating characteristics of item response categories 4: Comparison of the different methods
[AD-A057161] N78-33735
RETINAL IMAGES
Hysteresis in human binocular fusion: A second look
N78-33711
RETROFITTING
Unstable resonator retrofitted handheld laser designator
[AD-A057248] N78-33432
REVERSE FIELD PINCH
A toroidal fusion reactor design based on the reversed-field pinch
N78-33926
RHENIUM
Radio frequency size effect measurements on the Fermi surface of rhenium
N78-33962
RIBBONS
Analysis/design of strip reinforced random composites [strip hybrids]
[NASA-TM-78985] N78-33149
RIGID STRUCTURES
Telescoping columns --- parabolic antenna support
[NASA-CASE-LAR-12195-1] N78-33446
RING LASERS
Investigations of the coherence properties of a ring laser
N78-33421
RINGS
Analysis of a high speed ring valve system for a single cylinder reciprocating compressor
N78-33442
RIOMETERS
Multifreqency riometer measurements at high latitudes
[REPT-27] N78-33285
ROBIN BALLOONS
ABRES pretest atmospheric measurements
[AD-A055285] N78-33657
ROCKET EXHAUST
Development of base pressure similarity parameters for application to space shuttle launch vehicle power-on aerodynamic testing
[NASA-CR-150826] N78-33134
Design criteria for rocket exhaust scrubbers
[PB-282255/9] N78-33637
ROCKET SOUNDING
Analysis of conjunctive rocketborne inflatable sphere and bead thermistor soundings
[AD-A056943] N78-33662
ROCKET VEHICLES
Research and development of antennas for rockets and satellites
[AD-A056710] N78-33349
ROCKET-BORNE INSTRUMENTS
A digital control unit for a rocket borne quadrupole mass spectrometer
[AD-A057251] N78-33141
ROCKS
Discrimination of rock classes and alteration products in southwestern Saudi Arabia with computer-enhanced LANDSAT data
[NASA-TP-1327] N78-33499
Mapping ultramafic rocks by computer analysis of digital LANDSAT data
N78-33504
Geology of the northern Sierra Nevada basement rocks, Quincy-Downieville area, California
N78-33640
ROCKY MOUNTAINS [NORTH AMERICA]
Preliminary optimization model for assessment of energy development in the Rocky Mountain region
[LA-6689-MS] N78-33558
ROLLER BEARINGS
The practical impact of elastohydrodynamic lubrication
[NASA-TM-78987] N78-33445
ROLLING CONTACT LOADS
Rolling element fatigue testing of gear materials
[NASA-CR-135450] N78-33463
ROTARY WINGS
Theoretical study of multicyclic control of a controllable twist rotor
[NASA-CR-151959] N78-33085
ROTATING BODIES
Measurement of unsteady pressures in rotating systems
[NASA-TM-75445] N78-33042
An approximate solution for the free vibrations of rotating uniform cantilever beams
[NASA-TM-X-62299] N78-33289
ROTATING DISKS
Redundant disc
[NASA-CASE-LEW-12496-1] N78-33101
ROTATING ENVIRONMENTS
The interaction between the utricles and the semicircular canals during eccentric rotation
N78-33714
ROTATING GENERATORS
A study of the effect of the rotor coil couplings of a synchronous machine on its predicted transient response
N78-33330
ROTATING SHAFTS
Development of a cryogenic rotating heat pipe joint
[NASA-CR-152188] N78-33384
ROTATION
Investigations of the coherence properties of a ring laser
N78-33421
ROTOR BLADES [TURBOMACHINERY]
An approximate method for calculating the mean streamlines of the direct problem of an open rotor
[AD-A057151] N78-33388
RUBBER
Thermoplastic rubber comprising ethylene-vinyl acetate copolymer, asphalt and fluxing oil
[NASA-CASE-NPO-88351] N78-33228
Assessment of industrial hazardous waste practices, rubber and plastics industry: Executive summary
[PB-282070/2] N78-33270
Assessment of industrial hazardous waste practices, rubber and plastics industry: Rubber products industry
[PB-282072/8] N78-33272
Assessment of industrial hazardous waste practices, rubber and plastics industry: Appendices
[PB-282073/6] N78-33273
RUNWAYS
Parameters of future ATC systems relating to airport capacity/delay
[AD-A057059] N78-33068
RURAL LAND USE
Federal-assistance programs and energy-development-impacted municipalities
[FEA/D-77/039] N78-33549

S

SAFETY DEVICES
Anthropometry: Basic studies and applications, volume 2. A bibliography with abstracts
[NTIS/PS-78/0866/0] N78-33726

Vehicle integration and evaluation of advanced restraint systems. Restraint system analysis report
[PB-281475/4] N78-33744
SAFETY FACTORS
California air pollution control laws --- health and safety code
[PB-281786/4] N78-33632
SALT SPRAY TESTS
Galvanic corrosion fatigue testing of 7075-T6 aluminum bonded with graphite-epoxy composite
[AD-A055714] N78-33197
SALYUT SPACE STATION
Biological experiments on board Salyut-6
N78-34032
SAMPLES
Plural output optimetric sample cell and analysis system
[NASA-CASE-NPO-10233-1] N78-33913
SAMPLING
NURE geochemical investigations in the eastern United States
[DP-MS-77-101] N78-33517
Techniques for sampling and analyzing the marine macrobenthos
[PB-281631/2] N78-33697
A geometrical view of the Kolmogorov-Smirnov statistics with multi-sample generalizations
N78-33855
Maximum modified likelihood estimation of population size
N78-33858
New nonparametric approach to the two sample problem
[AD-A056706] N78-33862
SANDWICH STRUCTURES
Impact tests on fibrous composite sandwich structures
[NASA-TM-78719] N78-33152
An evaluation of the sandwich beam in four-point bending as a compressive test method for composites
[NASA-TM-78783] N78-33153
SATELLITE ANTENNAS
Research and development of antennas for rockets and satellites
[AD-A056710] N78-33349
SATELLITE ATTITUDE CONTROL
Independent stability and control analysis of navigation development satellites for the global positioning system. Volume 1: Technical report
[AD-A056811] N78-33081
Independent stability and control analysis of navigation development satellites for the global positioning system. Volume 2: Appendixes
[AD-A056812] N78-33082
SATELLITE INSTRUMENTS
ATS-6 flight accelerometers --- in-flight monitoring of spacecraft dynamic response
[NASA-TM-79847] N78-33096
SATELLITE OBSERVATION
Ecosystem mapping by interpretation of landscapes from satellite imagery
N78-33503
Radiophysical investigations of Venus from spacecraft --- radio emission from Venus and the Sun
[NASA-TM-75578] N78-34017
SATELLITE ORBITS
Development, test, and calibration of a three-axis accelerometer system
[AD-A056711] N78-33408
SATELLITE TRACKING
Application of inversion theory to new satellite systems for determination of the gravity field
[AD-A057188] N78-33666
SATELLITE-BORNE INSTRUMENTS
Preliminary studies of electromagnetic sounding of cometary nuclei
[NASA-CR-157764] N78-34022
SATELLITE-BORNE PHOTOGRAPHY
Application of an array processor in satellite image processing
[AD-A056664] N78-33755
SATELLITE-TO-SATELLITE TRACKING
Ionospheric refraction corrections in the GTDS for satellite-to-satellite tracking data
[NASA-CR-156834] N78-33654
SAUDI ARABIA
Discrimination of rock classes and alteration products in southwestern Saudi Arabia with computer-enhanced LANDSAT data
[NASA-TP-1327] N78-33499
SCALE MODELS
Phased array antenna amplifier exploratory development model [100 watts]
[AD-A056173] N78-33301
SCANNERS
Wire-scanner reentering experiment error estimates
[LA-6959-MS] N78-33418
A Nimbus G pre launch field experiment in the Gulf of Mexico, October 1977
[NASA-CR-157786] N78-33509
SCAVENGING
Rain scavenging studies
[COO-1407-65] N78-33676
SCENE ANALYSIS
A methodology for nonlinear feature extraction in statistical pattern recognition
N78-33819
SCIENCE
Engineering and Scientific Data Management
[NASA-CP-2055] N78-33776
SDMS: A scientific data management system
N78-33783
A data management system for engineering and scientific computing
N78-33786
SCIENTISTS
Systems analysis of scientific and technical communication in the United States: The electronic alternative to communication through paper-based journals
[PB-281847/4] N78-33986
Systems analysis of scientific and technical communication in the United States. Annex 1: Communication functions in science and technology
[PB-281848/2] N78-33987
Systems analysis of scientific and technical communication in the United States: Annex 2: The current practices
[PB-281849/0] N78-33988
Systems analysis of scientific and technical communication in the United States. Annex 3: An electronic alternative
[PB-281850/8] N78-33989
Systems analysis of scientific and technical communication in the United States. Annex 4: The cost model
[PB-281851/6] N78-33990
SCRUBBERS
Design criteria for rocket exhaust scrubbers
[PB-282255/9] N78-33637
SEA STATES
GEOS-3 ocean current investigation using radar altimeter profiling --- Gulf Stream surface topography
[NASA-TM-73280] N78-33696
Further studies of sunlight glitter on a wind-ruffled sea --- oil slicks
[AD-A056850] N78-33917
SEA WATER
Catalog information on the performance of aluminum in sea water --- ocean thermal energy conversion
[PNL-2606] N78-33211
Revised simplified formulae for calculating the speed of sound in sea water
[AD-A056556] N78-33877
SEALERS
Development of alternate silicone potting compounds. Volume 2: Development of the primary alternate for Dow Corning's aerospace sealant, DC 93-119
[UCRL-52434-VOL-2] N78-33242
SEARCH PROFILES
Technology utilization in a non-urban region: Further impact and technique of the Technology Use Center
[NASA-CR-157743] N78-34006
SEAT BELTS
Evaluation of seating and restraint systems and anthropomorphic dummies conducted during fiscal year 1977
[AD-A056905] N78-33737
SEATS
Evaluation of seating and restraint systems and anthropomorphic dummies conducted during fiscal year 1977
[AD-A056905] N78-33737
G-seat component development
[AD-A055533] N78-33740
Emulation of an advanced G-seat on the advanced simulator for pilot training
[AD-A055532] N78-33741
SECONDARY FLOW
Derivation and evaluation of an approximate analysis for three-dimensional viscous subsonic flow with large secondary velocities --- finite difference method
[NASA-CR-159430] N78-33044
An approximate method for calculating the mean streamlines of the direct problem of an open rotor
[AD-A057151] N78-33388
SECONDARY INJECTION
Multiple stage optimal control problems with applications to plasma heating by neutral injection
[AD-A056856] N78-33935
SECURITY
Agencies, implementation of and compliance with the Privacy Act can be improved
[PB-281768/2] N78-33997
SEDIMENTS
NURE geochemical investigations in the eastern United States
[DP-MS-77-101] N78-33517
Light hydrocarbons in marine sediments --- Texas-Louisiana coastal shelve region
N78-33614
Laboratory and field measurements of upwelled radiance and reflectance spectra of suspended James River sediments near Hopewell, Virginia
[NASA-TP-1292] N78-33616
Acoustic identification of marine sediments by stochastic methods
N78-33695
Meteor ablation spheres from deep-sea sediments
[NASA-TM-78510] N78-34021
SEISMIC WAVES
Acoustic holography. Citations from the NTIS data base
[NTIS/PS-78/0700/1] N78-33885
Acoustic holography. Citations from the engineering index data base
[NTIS/PS-78/0701/9] N78-33886
SEISMOLOGY
Statistical models for seismic magnitude
[AD-A056140] N78-33658
SELF FOCUSING
Anomalous dispersion and the pumping of far infrared [FIR] lasers
[NASA-TM-79596] N78-33424
SELF OSCILLATION
A theory for longitudinal short-period pilot induced oscillations
[AD-A056982] N78-33120
SEMICIRCULAR CANALS
The interaction between the utricles and the semicircular canals during eccentric rotation
N78-33714
SEMICONDUCTING FILMS
Growth and characterization of semi-insulating GaN thin films
N78-33954
SEMICONDUCTOR DEVICES
The present situation and forecasts of semiconductor elements performance within the microwave range, 1970-1985
[NASA-TM-75453] N78-33338
Transistor step stress testing program, JANTX 2N2905A
[NASA-CR-150821] N78-33341
Computer aided engineering of semiconductor integrated circuits
[AD-A056914] N78-33345
Light emitting diodes, volume 2. A bibliography with abstracts
[NTIS/PS-78/0736/5] N78-33362
SEMICONDUCTOR JUNCTIONS
Thin-film metal-oxide-metal junction devices
N78-33953
SEMICONDUCTORS [MATERIALS]
Measurement techniques for high power semiconductor materials and devices
[PB-281723/7] N78-33360
Wavelength modulation spectroscopy of semiconductors
N78-33948
Far infrared cyclotron resonance in semiconducting lead telluride
N78-33950
SENSORS
Sensor applications study. Technical report, task 1
[TID-27941] N78-33516
SEQUENTIAL ANALYSIS
Sequential least squares estimation of slowly time-varying parameters --- applicable to digital signal processing
N78-33834
SEQUENTIAL COMPUTERS
The transition-map-entered-variable [T-MEV] mapping technique for sequential machine design
N78-33749
SEQUENTIAL CONTROL
Binary sequences for spread-spectrum multiple-access communication
[AD-A056552] N78-33297
SERIES [MATHEMATICS]
An adaptive orthogonal-series estimator for probability density functions
N78-33849
SERVICE LIFE
Cycle life test --- of secondary spacecraft cells
[NASA-CR-156846] N78-33539
SERVICES
Federal-assistance programs and energy-development-impacted municipalities
[FEA/D-77/039] N78-33549
SET THEORY
A mathematical structure
N78-33824
SETTLING
The effect of dissolved oxygen concentration activated sludge process performance
N78-34002
SHALE OIL
Thermal conversion of oil-shale kerogen using CO and water at elevated pressures
[LERC-78/1] N78-33552
SHEAR FLOW
Propagation of sound through a sheared flow
[NASA-CR-152196] N78-33876
SHEAR LAYERS
Experimental study of chemically reacting turbulent free shear layers
[FE-2446-4] N78-33398

SHEAR STRESS
Experimental analysis and computation of the onset and development of the boundary layer transition
[NASA-TM-75325] N78-33041
Analysis of graphite/polyimide rail shear specimens subjected to mechanical and thermal loading
[NASA-CR-157769] N78-33481

SHIPS
Vulnerability of surface effect vehicles to explosion generated water waves
[AD-A055503] N78-33267

SHOCK TUBES
An experimental investigation of the critical supersaturation of five vapors in a shock tube --- Freon benzene, carbon tetrachloride, water and heavy water
[AD-A056859] N78-33172

SHOCK WAVE INTERACTION
Oblique shock wave/turbulent boundary layer interactions in three dimensions at Mach 3, part 2
[AD-A057010] N78-33056

SHOCK WAVES
Explosion effects and properties. Part 2: Explosion effects in water
[AD-A056694] N78-33254

SHRINKAGE
Pore shrinkage and Ostwald ripening in metallic systems
[COO-4385-2] N78-33222

SIERRA NEVADA MOUNTAINS [CA]
Geology of the northern Sierra Nevada basement rocks, Quincy-Downieville area, California
N78-33640

SIGNAL PROCESSING
System definition and investigation of the on site processing of en route sensor signals. Addendum: Investigation into possible en route on site beacon ring around discriminants
[AD-A056941] N78-33070
The performance of digital matched filters for multilevel signals
N78-33280
Identification of periodically amplitude modulated targets
[AD-A056516] N78-33299
The storage correlator: Theory and signal processing applications
N78-33327
Microwave acoustic and bulk device technique studies
[AD-A057256] N78-33348
Sequential least squares estimation of slowly time-varying parameters --- applicable to digital signal processing
N78-33834

SIGNAL RECEPTION
Minimum antenna dimensions for satellite-communication earth stations
[PB-282109/8] N78-33324
A theoretical investigation of signal acquisition and digital communication in a coupling-modulated carbon dioxide laser system
N78-33422

SIGNAL TO NOISE RATIOS
Radar processing with baseband hard limiting
N78-33281

SIGNATURE ANALYSIS
An analytic study of a minimum chi-2-estimation procedure
N78-33848

SILICON
A model dielectric function for silicon
N78-33959
Ion implantation of wide bandgap semiconductors --- silicon n-type semiconductors
[AD-A056125] N78-33968

SILICON ALLOYS
Floating substrate process: Large-area silicon sheet task low-cost solar array project
[NASA-CR-157759] N78-33265

SILICON CARBIDES
Effect of silicon carbide on devitrification of a glass coating for reusable surface insulation
[NASA-TM-78755] N78-33230

SILICON DIOXIDE
Studies of avalanche injection of charge into SiO2 using gated diode structures
N78-33326

SILICONE RESINS
Development of alternate silicone potting compounds. Volume 2: Development of the primary alternate for Dow Corning's aerospace sealant, DC 93-119
[UCRL-52434-VOL-2] N78-33242

SILICONES
Development of alternate silicone potting compounds. Volume 1: Experimental program
[UCRL-52434-VOL-1] N78-33244

SIMILARITY THEOREM
General convergence theorems: Their relationships and applications
N78-33830

SIMULATION
Numerical simulation of two-phase flow in vertical pipes
N78-33366

SINGLE CRYSTALS
Impression creep of LiF and Cu-Ni single crystals
N78-33956
Cleavage behavior as a function of composition for single crystals of the Mo-Nb system
[COO-3476-15] N78-33972

SINGLE SIDEBAND TRANSMISSION
Hardware design of a digital single-sideband generator
[AD-A057033] N78-33303

SINTERING
Influence of dispersed refractory oxides in retarding catalyst sintering
[EPRI-EM-624] N78-33214
Catalyst sintering studies --- phosphoric acid fuel cells
[EPRI-EM-661] N78-33577

SIZE DETERMINATION
Determination of particle size using measurement of scatter
[NASA-CR-157741] N78-33914

SKIN FRICTION
Direct measurements and analysis of skin friction and cooling downstream of multiple flush-slot injection into a turbulent Mach 6 boundary layer
[NASA-TP-1176] N78-33385

SMOG
Acoustic sounder array for application to air pollution. Volume 1: Executive summary and user guide
[PB-282064/5] N78-33670
Acoustic sounder array for application to air pollution. Volume 2: Case studies and other appendices
[PB-282065/2] N78-33671

SMOKE
Computer simulation of the visual effects of smoke plumes
[LA-UR-78-689] N78-33625

SODIUM
Research in laser processes
[AD-A056030] N78-33427
Theoretical and experimental studies of the atmospheric sodium layer
[NASA-CR-157770] N78-33653

SODIUM VAPOR
Sodium vapor heat pipe laser cell
[LA-UR-78-532] N78-33392

SOIL EROSION
Relationships of clay mineralogy to landscape stability in Western Oregon
N78-33500

SOILS
Effect of surface roughness on the microwave emission from soils
[NASA-TM-79606] N78-33284

SOLAR ACTIVITY
Updating of ADAPT predictions of sunspot activity
[NASA-CR-150823] N78-34024

SOLAR ARRAYS
Floating substrate process: Large-area silicon sheet task low-cost solar array project
[NASA-CR-157759] N78-33265
Module/array interface study
[NASA-CR-157774] N78-33533
Terrestrial central station array life-cycle analysis support study
[NASA-CR-157772] N78-33534
Evaluation available encapsulation materials for low-cost long-life silicon photovoltaic arrays
[NASA-CR-157758] N78-33535

SOLAR CELLS
Evaluation available encapsulation materials for low-cost long-life silicon photovoltaic arrays
[NASA-CR-157758] N78-33535
Center punched solar cell module development effort
[NASA-CR-157760] N78-33536

SOLAR COLLECTORS
High-temperature linear radiation-cavity solar collector with a Fresnel concentrator
N78-33524
Development of flat-plate solar collectors for the heating and cooling of buildings: Executive summary
[NASA-CR-134804] N78-33527
Installation package for Sunpak solar collectors
[NASA-CR-150802] N78-33528
Development and fabrication of a concentrating solar collector subsystem
[NASA-CR-150787] N78-33529
Certification and verification for Calmac flat plate solar collector
[NASA-CR-150784] N78-33532
Design of CPC photovoltaic solar collectors
[CONF-780114-8] N78-33585
Heliostat systems design and operation. Citations from the engineering index data base
[NTIS/PS-78/0842/1] N78-33608
Flat plate solar collector design and performance. Citations from the engineering index data base
[NTIS/PS-78/0841/3] N78-33610

SOLAR COOLING
Minimum Energy Dwelling [MED] workbook: An investigation of techniques and materials for energy conscious design
[SAN-1198-1] N78-33553

SOLAR CORONA
An observer's manual for the Air Force swept frequency interferometric radiometer
[AD-A056994] N78-33411

SOLAR CYCLES
Updating of ADAPT predictions of sunspot activity
[NASA-CR-150823] N78-34024

SOLAR ENERGY
Contribution of chemistry to energy
[LA-UR-78-706] N78-33559
Solar total energy system: Large scale experiment. Phase 2: Conceptual design
[SE-3986-1] N78-33566
Institutional applications of solar total energy systems
[ALO-3786-2] N78-33569
Research on the application of solar energy to industrial drying or dehydration processes
[ORO-5123-1] N78-33583
Solar-thermochemical production of hydrogen from water
[LA-UR-78-1052] N78-33586
Solar-thermal conversion to electricity utilizing a central receiver, open-cycle gas turbine design
[EPRI-ER-652] N78-33587
Solar energy concentrator design and operation. Citations from the engineering index data base
[NTIS/PS-78/0839/7] N78-33609

SOLAR ENERGY CONVERSION
Solar total-energy large-scale experiment at Shenandoah, Georgia
[SAND-77-2075C] N78-33561
Environmental Development Plan [EDP]: Solar agricultural and industrial process heat, 1977
[DOE/EDP-0002] N78-33568
Central receiver solar thermal power system. Phase 1. CDRL item 2, pilot plant preliminary design report. Volume 2: System description and system analysis
[SAN-1108-8/1-VOL-2] N78-33571
Cu/sub x/S-[Cd, Zn]S photovoltaic solar energy converters
[HCP/T7405-1] N78-33582
Amorphous semiconductors in photovoltaic and solar thermal conversion
[BNL-24216] N78-33584

SOLAR GENERATORS
Solar total energy system: Large scale experiment. Phase 2: Conceptual design
[SE-3986-1] N78-33566

SOLAR HEATING
Solar heat transport fluid
[NASA-CR-150806] N78-33530
Design package for a complete residential solar space heating and hot water system
[NASA-CR-150795] N78-33531
Minimum Energy Dwelling [MED] workbook: An investigation of techniques and materials for energy conscious design
[SAN-1198-1] N78-33553
Phoenix House: Solar-assisted heat pump system evaluation
[EPRI-ER-712] N78-33574

SOLAR OBSERVATORIES
An observer's manual for the Air Force swept frequency interferometric radiometer
[AD-A056994] N78-33411

SOLAR RADIATION
On the nature and distribution of solar radiation --- insolation and earth atmosphere effects
[HCP/T2552-01] N78-33667

SOLAR RADIO EMISSION
Radiophysical investigations of Venus from spacecraft --- radio emission from Venus and the Sun
[NASA-TM-75578] N78-34017

SOLAR SPECTRA
Measurement of transition probabilities for Mn I lines and the manganese solar abundance
N78-33890
Proposed rocket experiments to measure the profile and intensity of the solar He1584A resonance line
[NASA-CR-156779] N78-34023

SOLID PROPELLANT ROCKET ENGINES
Nitric oxide production in the stratosphere within the Space Shuttle's solid rocket motor plumes
[NASA-TP-1305] N78-33135

SOLID PROPELLANTS
Application of impedance tube technique in the measurement of burning solid propellant admittances
N78-33248

SOLID SOLUTIONS
Thermodynamics of carbon in nickel-based multicomponent solid solutions
[ORNL/TM-6282] N78-33206

SOLID STATE
Thermal and molecular effects on solid state behavior of rigid poly[vinylchloride]
N78-33227
Constructive solid geometry
[PB-281613/0] N78-33842

SOLID STATE DEVICES
Active devices for high temperature microcircuitry
[SAND-77-1145] N78-33414

SOLID SURFACES
Experimental and theoretical study of the surface states/surface resonances on the [100] faces of group VIB transition metals
N78-33964

SOLID SUSPENSIONS
Deposition of suspensions in laminar flow in the entrance region of channels with diffusive, electrostatic and gravitational effects
N78-33369

SOLID WASTES
Assessment of industrial hazardous waste practices, rubber and plastics industry: Plastic materials and synthetics industry
[PB-282071/0] N78-33271
Assessment of industrial hazardous waste practices, rubber and plastics industry: Rubber products industry
[PB-282072/8] N78-33272

SOLIDS
A study of geometric set-membership classification
[PB-281573/6] N78-33843
Mathematical models of rigid solid objects
[PB-281535/5] N78-33844

SOLUBILITY
Catalytic conversion of solvent refined coal to liquid products
[LBL-6807] N78-33258
Stability of sparingly soluble monolayers at the air-water interface
N78-33378

SOLVENT EXTRACTION
Catalytic conversion of solvent refined coal to liquid products
[LBL-6807] N78-33258

SONAR
Acoustic holography. Citations from the NTIS data base
[NTIS/PS-78/0700/1] N78-33885
Acoustic holography. Citations from the engineering index data base
[NTIS/PS-78/0701/9] N78-33886

SOUND FIELDS
Measurements of energy exchange between acoustic fields and non-uniform steady flow fields
N78-33249

SOUND PROPAGATION
Propagation of sound through a sheared flow
[NASA-CR-152196] N78-33876

SOUND TRANSMISSION
Mathematical analysis of effects of underwater sound-source motion on received total acoustic field
N78-33872

SOUND WAVES
Mathematical analysis of effects of underwater sound-source motion on received total acoustic field
N78-33872
An analog FFT beamformer for acoustic applications
[AD-A057057] N78-33879

SOUNDING
ABRES pretest atmospheric measurements
[AD-A055285] N78-33657

SOURCE PROGRAMS
Source and channel coding theory
N78-33767
Project RMAG: Symbolic logic retrieval source code
[PB-281373/1] N78-33979

SOYUZ SPACECRAFT
From space on a parachute
[NASA-TM-75577] N78-33140

SPACE CHARGE
Analysis of electron retarding potential analyzer measurements of vehicle skin potential in the PRECEDE experiment
[AD-A057250] N78-33347

SPACE ERECTABLE STRUCTURES
Telescoping columns --- parabolic antenna support
[NASA-CASE-LAR-12195-1] N78-33446

SPACE EXPLORATION
Canada in space
N78-33126
PLACE: Post LANDSAT D Advanced Concept Evaluation
[E78-10156] N78-33506

SPACE PROGRAMS
Canada in space
N78-33126

SPACE SHUTTLE BOOSTERS
Development of base pressure similarity parameters for application to space shuttle launch vehicle power-on aerodynamic testing
[NASA-CR-150826] N78-33134

SPACE SHUTTLE ORBITERS
Station keeping of the space shuttle in the vicinity of a deployed payload
[AD-A056109] N78-33136

SPACE SHUTTLE PAYLOADS
Experiment definition and integration study for the accommodation of giant, passive detector of Exotic Particles In the Cosmic Rays [EPIC] payload on shuttle/spacelab missions
[NASA-CR-156842] N78-34025

SPACE SHUTTLES
Nitric oxide production in the stratosphere within the Space Shuttle's solid rocket motor plumes
[NASA-TP-1305] N78-33135
Effect of silicon carbide on devitrification of a glass coating for reusable surface insulation
[NASA-TM-78755] N78-33230

SPACE-TIME FUNCTIONS
An investigation of a space time clustering problem
N78-33850

SPACECRAFT COMMUNICATION
AFSATCOM life cycle cost model
[AD-A056102] N78-33131

SPACECRAFT ENVIRONMENTS
Convection induced by G-jitter in rectangular enclosures aboard spacecraft
N78-33084

SPACECRAFT LANDING
From space on a parachute
[NASA-TM 75577] N78-33140

SPACECRAFT POWER SUPPLIES
Cycle life test --- of secondary spacecraft cells
[NASA-CR-156846] N78-33539

SPECIFIC HEAT
The specific heat of helium four near the superfluid transition in a confined geometry
N78-33966

SPECTRAL ENERGY DISTRIBUTION
Optical characteristics of the earth's surface and atmosphere from the point of view of the remote sensing of natural resources: Review of the contemporary status of the problem
[NASA-TM-75548] N78-33642

SPECTRAL REFLECTANCE
Laboratory and field measurements of upwelled radiance and reflectance spectra of suspended James River sediments near Hopewell, Virginia
[NASA-TP-1292] N78-33616
Wavelength modulation spectroscopy of semiconductors
N78-33948
Infrared spectra of lunar soil analogs --- spectral reflectance of minerals
[NASA-CR-157742] N78-34020

SPECTRAL SIGNATURES
Infrared spectra of lunar soil analogs --- spectral reflectance of minerals
[NASA-CR-157742] N78-34020

SPECTROMETERS
Manual for the application of NURE 1974-1977 aerial gamma-ray spectrometer data
[GJBX-13-78] N78-33519

SPECTROPHOTOMETERS
Forced-flow chromatographic determination of calcium and magnesium with continuous spectrophotometric detection
[IS-T-806] N78-33179

SPECTRUM ANALYSIS
Spectral analysis methods for noisy sampled-data systems
N78-33331
Investigation of micropulsation activity. 1: MAGAF system additions. 2: Data analysis
[AD-A056716] N78-33661

SPEECH
Digroup data reduction system
[AD-A056986] N78-33304

SPEECH RECOGNITION
Spectral distortion measures for speech compression
[AD-A056853] N78-33316

SPHERES
Mie theory for non spherical particles
[AD-A056435] N78-33305

SPHERICAL SHELLS
Buckling of reinforced concrete spherical shells
N78-33472
Room-temperature inelastic test of a nozzle-to-spherical-shell model subjected to pressure and moment loading
[ORNL/TM-6170] N78-33490

SPHERICAL TANKS
Stress-rupture life of Kevlar/epoxy spherical pressure vessels
[UCID-17755-PT-1] N78-33492

SPHERULES
Meteor ablation spheres from deep-sea sediments
[NASA-TM-78510] N78-34021

SPILLING
Hazardous material spills: A documentation and analysis of historical data
[PB-281090/1] N78-33631

SPIN-LATTICE RELAXATION
Magnetic properties of two dilute spin systems --- amorphous metals
N78-33957

SPINE
The lumbosacral segment as a vulnerable region in various postures
[NASA-TM-75579] N78-33713

SPONTANEOUS EMISSION
Characteristics of amplified spontaneous emissions in high-gain gas-laser amplifiers
N78-33419

SPORADIC E LAYER
Some properties of high latitude sporadic E
[REPT-29] N78-33651

SPREAD SPECTRUM TRANSMISSION
Binary sequences for spread-spectrum multiple-access communication
[AD-A056552] N78-33297

SPUTTERING
Ion beam sputtering of fluoropolymers --- etching polymer films and target surfaces
[NASA-TM-79000] N78-33151
Temperature dependence of hydrogen sputtering of carbon coatings on platinum
[GA-A-14608] N78-33221

STABILITY
Stability of sparingly soluble monolayers at the air-water interface
N78-33378

STABILITY DERIVATIVES
Aerodynamic derivatives for an oblique wing aircraft estimated from flight data by using a maximum likelihood technique
[NASA-TP-1336] N78-33054
Hybrid computer study of the sensitivity of aircraft dynamics to aerodynamic cross-coupling
[SAND-77-1309C] N78-33121

STABLE OSCILLATIONS
Surface acoustic wave stabilized oscillators: Additional aging results
[NASA-CR-156833] N78-33340

STAGNATION FLOW
A visual investigation of turbulence in stagnation flow about a circular cylinder
[NASA-CR-3019] N78-33386

STAINLESS STEELS
Interaction of Xenon light with the surface of 304 stainless steel
[RFP-2647] N78-33205

STANDARDS
Journal of Research of the National Bureau of Standards. Volume 83, No. 1, January - February 1978
[PB-281311/1] N78-33274
Publication and services of the Cryogenics Division, National Bureau of Standards, 1953 - 1977
[PB-281465/5] N78-33276
Science on its way to work: Activities of the National Bureau of Standards
[PB-282044/7] N78-34000

STATIC PRESSURE
Static pressure orifice system testing and apparatus
[NASA-CASE-LAR-12269-1] N78-33123

STATISTICAL ANALYSIS
Communications Link Characterization Experiment (CLCE) technical data report, volume 2
[NASA-CR-156808] N78-33286
Estimation of the operating characteristics of item response categories 4: Comparison of the different methods
[AD-A057161] N78-33735
A geometrical view of the Kolmogorov-Smirnov statistics with multi-sample generalizations
N78-33855
A study of two-armed bandits
N78-33857
A density-quantile function perspective on robust estimation
[AD-A056707] N78-33861
Techniques of quantile regression
[AD-A056705] N78-33863
The statistical manipulation of delphi statements
N78-34003

STATISTICAL CORRELATION
An estimation procedure for the 3-parameter Weibull distribution in modeling hypertension data
N78-33854

STATISTICAL DISTRIBUTIONS
Information theoretic methods for indicating the speed of convergence and approximation accuracy of distributions
N78-33845
Bayesian reliability analysis of the alpha distributions with applications
N78-33847
An investigation of a space time clustering problem
N78-33850
A study of two-armed bandits
N78-33857

STATISTICAL TESTS
New nonparametric approach to the two sample problem
[AD-A056706] N78-33862

STATISTICS
Table producing language systems installation instructions, version 4.0
[PB-281376/4] N78-33802
Print control language, version 4.0: Users guide
[PB-281377/2] N78-33803
Table producing languages, version 4.0: Users guide. Including codebook language
[PB-281378/0] N78-33804
The development and uses of Table Producing Language
[PB-281379/8] N78-33805

STEADY FLOW
Measurements of energy exchange between acoustic fields and non-uniform steady flow fields
N78-33249

STEADY STATE
Monotone steady-state potential distributions in the standard collisionless plane diode model of the single-ended Q-machine --- thermionic converters
[UNICP-FSP-78/1] N78-33931

STEAM
Nondestructive evaluation of steam turbine rotors: An analysis of the systems and techniques utilized for inservice inspection
[EPRI-NP-744] N78-33469

STEEL STRUCTURES
Formation of iron carbonyl between a 1/2% Mo steel and high-pressure gases containing carbon monoxide
[ORNL-5410] N78-33215

STEELS
Review of the low-temperature properties of metals: A digest of selected literature
N78-33143

Review of the low-temperature properties of metals: A digest of selected literature
N78-33144

Long-term hot-hardness characteristics of five through-hardened bearing steels
[NASA-TP-1341] N78-33196

Computer-aided design and manufacturing for extrusion of aluminum, titanium and steel structural parts. Phase 2: Application to practical extrusions. Volume 2: User's manual for ALEXTR system of computer programs for design and manufacture of flat-face dies for aluminum extrusion
[AD-A056966] N78-33201

Heavy-section steel technology program
[ORNL/NUREG/TM-166] N78-33208

Study of the effects of several variables on the thermal conductivity of 2 1/4 Cr-1 Mo steel
[ORNL-5313] N78-33219

Electrodeposition of nickel onto steel using a soluble mobile anode
[K-1894] N78-33220

STELLAR MAGNETIC FIELDS
Particle acceleration in pulsar magnetospheres
[NASA-CR-157768] N78-34015

STELLAR RADIATION
Particle acceleration in pulsar magnetospheres
[NASA-CR-157768] N78-34015

STELLAR SPECTRA
X ray spectra of X Per --- oso-8 observations
[NASA-TM-79646] N78-34013

STIMULANT
The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain
N78-33701

STIMULATED EMISSION
Stimulated Raman scattering involving two plasma waves
[AD-A056855] N78-33936

STOCHASTIC PROCESSES
Mechanical system identification and decomposition by dynamic data system methodology
N78-33443

Climate forecast verification via multinomial stochasters
[AD-A056920] N78-33681

Acoustic identification of marine sediments by stochastic methods
N78-33695

Adaptive stochastic control of linear systems with random parameters
[AD-A056849] N78-33822

Large deviations for diffusions depending on small parameters: A stochastic control method
[AD-A055652] N78-33860

The application of Doubly Stochastic Poisson Process estimation techniques to optical intensity estimation for Gaussian optical fields
N78-33909

STOCKPILING
Contingency plans for chromium utilization. Publication NMAB-335
[NASA-CR-157789] N78-33207

STOKES LAW OF RADIATION
A four-channel polarimeter to measure nanosecond laser pulses --- Stokes law of radiation
[AD-A056423] N78-33431

STORAGE
In-orbit storage of NOAA-NESS standby satellites
[PB-283078/4] N78-33133

STORAGE BATTERIES
Cycle life test --- of secondary spacecraft cells
[NASA-CR-156846] N78-33539

Lead batteries. Citations from the engineering index data base
[NTIS/PS-78/0690/4] N78-33606

STORAGE TANKS
Investigation of alternate types of water-storage components to be utilized in conjunction with the ACES system
[ORNL/SUB-78/14233/1] N78-33578

STORMS [METEOROLOGY]
National Severe Storms Laboratory: History and FY 1976 program
[PB-282665/9] N78-33688

STRAIN GAGES
Comparison of concurrent strain gage- and pressure transducer-measured flight loads on a lifting reentry vehicle and correlation with wind tunnel predictions
[NASA-TP-1331] N78-33053

STRAIN RATE
Determining crustal strain rates with a spaceborne geodynamics ranging system. 2: Station coordinate analysis
[NASA-TM-79627] N78-33647

STRATIFIED FLOW
A numerical study of upstream blocking and internal waves in a density stratified fluid
N78-33370

STRATOSPHERE
Nitric oxide production in the stratosphere within the Space Shuttle's solid rocket motor plumes
[NASA-TP-1305] N78-33135

Calculation of atmospheric composition in the high latitude September stratosphere
[AD-A055160] N78-33656

Are the stratospheric dust particles meteor ablation debris or interplanetary dust?
[NASA-TM-78507] N78-34014

STREAMLINING
An investigation of drag reduction for tractor trailer vehicles
[NASA-CR-144877] N78-33444

STRESS [PHYSIOLOGY]
An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance
[AD-A057113] N78-33733

STRESS ANALYSIS
Stress analysis of ceramic turbine blades by finite element method, part 1
[AD-A056310] N78-33111

Determination of the recovery stresses developed by shape memory alloys
[LBL-6884] N78-33216

Microstructurally developed toughening mechanisms in ceramics. Stress induced martensitic reaction. 2: Experiments in the ZRO2-Y2-O3 system
[AD-A057240] N78-33232

Transistor step stress testing program, JANTX 2N2905A
[NASA-CR-150821] N78-33341

Strength and deformation analysis of concrete under multiaxial stresses
N78-33474

Mathematical analysis of stress cracks, volume 1. A bibliography with abstracts
[NTIS/PS-78/0768/8] N78-33498

STRESS CONCENTRATION
Microstructurally developed toughening mechanisms in ceramics. Stress-induced martensitic reactions. 1: Theory of metastable phase retention and contribution to fracture toughness
[AD-A057239] N78-33231

STRESS CORROSION CRACKING
Localized corrosion and stress corrosion cracking behavior of austenitic stainless steel weldments containing retained ferrite
[COO-2462-4] N78-33213

An experimental study of the cracked nozzle problem occurring in pressure vessels
N78-33471

Crack tip plasticity associated with corrosion-assisted fatigue --- carbon steels
[AD-A056860] N78-33487

STRESS MEASUREMENT
Geometrical problems with a position sensitive detector employed on a diffractometer, including its use in the measurement of stress
[AD-A056662] N78-33486

Technique for measurements of plane waves of uniaxial strain
[SAND-77-0199C] N78-33494

STRESS RELAXATION
Metal deformation modeling: Stress relaxation of aluminum
[SAND-78-0164C] N78-33209

STRESS-STRAIN RELATIONSHIPS
Lightweight laser mirror structural studies
[Y-DA-7472] N78-33437

STRESSES
Streaming birefringence in extensional flow of polymer solutions
N78-33365

Estimation and testing of hypotheses for distributions in accelerated life tests
[AD-A056096] N78-33465

STRONTIUM 90
Economic feasibility of strontium-90 fueled heaters for use in cold regions
[PNL-2476] N78-33546

STRUCTURAL ANALYSIS
Analysis/design of strip reinforced random composites [strip hybrids]
[NASA-TM-78985] N78-33149

Guide to a condensed form of NASTRAN
[NASA-RP-1019] N78-33791

The growth and crystallographic characteristics of sulfide films on [111] copper investigated by RHEED
N78-33952

STRUCTURAL DESIGN
Module/array interface study
[NASA-CR-157774] N78-33533

STRUCTURAL DESIGN CRITERIA
Learning from fire: A fire protection primer for architects
[PB-283163/4] N78-33277

Automated resizing optimization of generally loaded planar frames via linear programming techniques
[AD-A056567] N78-33482

Room-temperature inelastic test of a nozzle-to-spherical-shell model subjected to pressure and moment loading
[ORNL/TM-6170] N78-33490

STRUCTURAL ENGINEERING
Primary Adhesively Bonded Structure Technology [PABST]. Phase 1: Detail design
[AD-A056857] N78-33095

Automated resizing optimization of generally loaded planar frames via linear programming techniques
[AD-A056567] N78-33482

STRUCTURAL PROPERTIES [GEOLOGY]
A study of the Tyrone-Mount Union lineament by remote sensing techniques and field methods
[E78-10155] N78-33505

STRUCTURAL STABILITY
Structural efficiency of long lightly loaded truss and isogrid columns for space applications
[NASA-TM-78687] N78-33480

STRUCTURAL VIBRATION
Theoretical study of multicyclic control of a controllable twist rotor
[NASA-CR-151959] N78-33085

Shake testing of vehicles through recorded simulation control scheme, volume 1
[AD-A056543] N78-33792

Recorded simulation control scheme: User's manual, volume 2, supplement
[AD-A056544] N78-33793

Noise-induced building vibrations caused by concorde and conventional aircraft operations at Dulles and Kennedy International Airports
[NASA-TM-78769] N78-33874

SUBMARINES
Evaluation of a triaxial SQUID magnetometer designed for use as an ELF magnetic antenna
[AD-A056361] N78-33293

SUBROUTINES
X10: A FORTRAN direct access data management system
N78-33784

A parameter estimation subroutine package
[NASA-CR-157766] N78-33789

User's manual for the BRL subroutine to calculate Bessel functions of integral order and complex argument
[AD-A056369] N78-33838

SUBSIDENCE
Evaluation of geothermal energy exploration and resource assessment, volume 1: A review of geothermal subsidence modeling
[SAN-1269-1-VOL-1] N78-33515

SUBSONIC FLOW
A viscous-inviscid interactive compressor calculation
N78-33040

Derivation and evaluation of an approximate analysis for three-dimensional viscous subsonic flow with large secondary velocities --- finite difference method
[NASA-CR-159430] N78-33044

SUBSONIC SPEED
Subsonic dynamic stability characteristics of two close-coupled canard-wing configurations
[NASA-TP-1291] N78-33050

An investigation of wing buffeting response at subsonic and transonic speeds: Phase 1: F-111A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152109] N78-33113

An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152110] N78-33114

An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152111] N78-33115

An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2 F-3A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152112] N78-33116

An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152113] N78-33117

An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152114] N78-33118

SUGAR CANE
Fuels from sugar crops
[TID-28191] N78-33259

SUN
Proposed rocket experiments to measure the profile and intensity of the solar He1584A resonance line [NASA-CR-156779] N78-34023
SUNLIGHT
Further studies of sunlight glitter on a wind-ruffled sea --- oil slicks [AD-A056850] N78-33917
SUNSPOTS
Updating of ADAPT predictions of sunspot activity [NASA-CR-150823] N78-34024
SUPERCONDUCTING MAGNETS
Materials studies for magnetic fusion energy applications at low temperatures, 1 [PB-282444/9] N78-33225
Report on work performed under P. O. 9667503, task 2 [UCRL-13829] N78-33268
SUPERCONDUCTORS
Review of the low-temperature properties of metals: A digest of selected literature N78-33143
Superconducting transistor [CONF-780339-1] N78-33359
SUPERCOOLING
Initial development of a tactical system for dispersing supercooled stratus [AD-A056570] N78-33677
SUPERFLUIDITY
The specific heat of helium four near the superfluid transition in a confined geometry N78-33966
SUPERHIGH FREQUENCIES
Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation [JPRS-71910] N78-33727
The combined effect of an SHF field and an unfavorable microclimate on the body N78-33730
SUPERPLASTICITY
Strain enhanced spheroidization and superplastic flow in a lead-tin eutectic alloy, part A. Development of a phenomenological equation for superplastic flow of fine grained materials, part B N78-33188
SUPERSATURATION
An experimental investigation of the critical supersaturation of five vapors in a shock tube --- Freon benzene, carbon tetrachloride, water and heavy water [AD-A056859] N78-33172
SUPERSONIC CRUISE AIRCRAFT RESEARCH
The common case study: Lockheed design of a supersonic cruise vehicle [NASA-CR-158935] N78-33086
SUPERSONIC SPEEDS
Estimation of leading-edge thrust for supersonic wings of arbitrary planform [NASA-TP-1270] N78-33051
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 2: Plotted power spectra [NASA-CR-152113] N78-33117
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 3: Tabulated power spectra [NASA-CR-152114] N78-33118
SUPERSONIC TURBINES
Performance of a transonic fan stage designed for a low meridional velocity ratio [NASA-TP-1298] N78-33107
SUPPLYING
Simple economic model for energy research and supply strategies, draft [DOE/ER-0005/D] N78-33557
SURFACE ACOUSTIC WAVE DEVICES
Surface acoustic wave stabilized oscillators: Additional aging results [NASA-CR-156833] N78-33340
SURFACE DEFECTS
Functional relationship of angular aberrations for systems with inhomogeneous media N78-34031
SURFACE DIFFUSION
Desorption and surface diffusion: Nitrogen on tungsten [110] [AD-A056346] N78-33165
SURFACE ENERGY
Early stages of the oxidation of metal surfaces --- photoelectron spectroscopy of zinc oxide [NASA-CR-157767] N78-33195
Experimental and theoretical study of the surface states/surface resonances on the [100] faces of group VIP transition metals N78-33964
SURFACE FINISHING
Ion beam sputtering of fluoropolymers --- etching polymer films and target surfaces [NASA-TM-79000] N78-33151
Surface cleaning in thin film technology [SAND-77-1716C] N78-33269
SURFACE LAYERS
A method of detecting and characterizing subsurface layers by means of electromagnetic depth sounding N78-33279
SURFACE PROPERTIES
Microstructurally developed toughening mechanisms in ceramics. Compressive surface stresses developed in ceramics by an oxidation-induced phase change [AD-A057242] N78-33234
Study of improvement of hydrogen maser frequency standard [NASA-CR-156836] N78-33425
SURFACE REACTIONS
Plasma surface interactions in Q-enhanced mirror systems [UCRL-80656] N78-33944
SURFACE ROUGHNESS
Effect of surface roughness on the microwave emission from soils [NASA-TM-79606] N78-33284
Ellipsometric determination of properties of films on rough surfaces such as aluminum alloy aircraft skin [AD-A056782] N78-33413
SURFACTANTS
Microprobe method for studying gas-liquid oxygen transfer in various surfactant systems N78-33160
SURVEYS
Sensor applications study. Technical report, task 1 [TID-27941] N78-33516
SWEAT
Relationship between osmotic pressure of the blood and secretion of sweat [NASA-TM-75461] N78-33703
SWEEP FREQUENCY
An observer's manual for the Air Force swept frequency interferometric radiometer [AD-A056994] N78-33411
SYMBOLIC PROGRAMMING
Project RMAG: Symbolic logic retrieval source code [PB-281373/1] N78-33979
Project RMAG: Symbolic logic retrieval users guide [PB-281374/9] N78-33980
SYMBOLS
Development of a symbology exerciser for display generation and analysis on the visually-coupled airborne systems simulator [VCASS] [AD-A055464] N78-33124
A symbolic system for computer-aided development of surface interpolants [AD-A056861] N78-33756
SYNTHESIS
Calcium chromate synthesis: Process variables study [GEPP-372] N78-33176
SYNTHETIC FIBERS
Design and development of helicopter external cargo sling legs made with Kevlar [AD-A056951] N78-33093
SYNTHETIC RESINS
Assessment of industrial hazardous waste practices, rubber and plastics industry: Plastic materials and synthetics industry [PB-282071/0] N78-33271
SYSTEM EFFECTIVENESS
Evaluation of FIDC system --- fuel vapor injector/igniter and lean limit controller for automobile engines [NASA-CR-157763] N78-34007
SYSTEMS ANALYSIS
Change detection and analysis in multi-spectral images N78-33746
Analysis of parallel system design using context-free grammars N78-33771
Input-output stability theory of interconnected systems N78-33807
Optimal joining policies for a queuing system having parallel channels N78-33817
Functional expansions in bilinear system analysis N78-33831
Multi-objective analysis applied to areawide wastewater management N78-34005
SYSTEMS ENGINEERING
Design package for a complete residential solar space heating and hot water system [NASA-CR-150795] N78-33531
Central receiver solar thermal power system. Phase 1. CDRL item 2, pilot plant preliminary design report. Volume 2: System description and system analysis [SAN-1108-8/1-VOL-2] N78-33571
Design of CPC photovoltaic solar collectors [CONF-780114-8] N78-33585
Computer science and technology: The design and implementation of the National Bureau of Standards' Network Access Machine [NAM] [PB-282510/7] N78-33762
An interactive system for the generation of standardized autopsy protocols N78-33773
Engineering and Scientific Data Management [NASA-CP-2055] N78-33776
Design representation and consistency maintenance needs N78-33777
A data management system for engineering and scientific computing N78-33786
Engineering data management: Experience and projections N78-33787
Hardware scheduling strategies for systems with many processors N78-33810
National Computer Center personnel management information system design requirements specification. Volume 1: Design requirements and data dictionary [PB-282589/1] N78-33981
National Computer Center personnel management information system design requirements specification. Volume 2: Report index and formats [PB-282590/9] N78-33982
Experiment definition and integration study for the accommodation of giant, passive detector of Exotic Particles In the Cosmic Rays [EPIC] payload on shuttle/spacelab missions [NASA-CR-156842] N78-34025

T

TABLES [DATA]
Explosion effects and properties. Part 2: Explosion effects in water [AD-A056694] N78-33254
Table producing language systems installation instructions, version 4.0 [PB-281376/4] N78-33802
Print control language, version 4.0: Users guide [PB-281377/2] N78-33803
Table producing languages, version 4.0: Users guide. Including codebook language [PB-281378/0] N78-33804
The development and uses of Table Producing Language [PB-281379/8] N78-33805
TABULATION PROCESSES
Table producing language systems installation instructions, version 4.0 [PB-281376/4] N78-33802
Print control language, version 4.0: Users guide [PB-281377/2] N78-33803
Table producing languages, version 4.0: Users guide. Including codebook language [PB-281378/0] N78-33804
The development and uses of Table Producing Language [PB-281379/8] N78-33805
High-speed lookup table technique for digital multiplication [SAND-77-1866] N78-33840
TANKS [CONTAINERS]
Review of the low-temperature properties of metals: A digest of selected literature N78-33144
TARGET ACQUISITION
Illumination requirements for target recognition and reacquisition as a function of field of view --- visual tasks [AD-A057235] N78-33252
TARGET RECOGNITION
Illumination requirements for target recognition and reacquisition as a function of field of view --- visual tasks [AD-A057235] N78-33252
The effects of changes in flare in intensity on the recognition probability of vehicular size targets [AD-A057238] N78-33253
Identification of periodically amplitude modulated targets [AD-A056516] N78-33299
TARGETS
Ion beam sputtering of fluoropolymers --- etching polymer films and target surfaces [NASA-TM-79000] N78-33151
Studies of impact-induced responses of a generic crushable-rigid rodlike missile against rigid and deformable targets [ASRL-TR-190-1] N78-33454
TASK COMPLEXITY
Environmental noise: The effects of information overload and control over the work environment on performance during and after exposure N78-33612
TECHNOLOGICAL FORECASTING
Engineering in the 21st century [NASA-TM-79010] N78-33380
TECHNOLOGY ASSESSMENT
Communications for a mobile society: An assessment of new technology [PB-281639/5] N78-33319
Appraisal of energy analysis [EPRI-EA-504] N78-33547
Environmental development plan for electric energy systems program, 1977 [DOE/EDP-0016] N78-33554

Open cycle ocean thermal energy conversion: A preliminary engineering evaluation
[ALO-3723-76/3] N78-33575
The 1976 energy resource alternatives II competition
[COO-2698-2] N78-33595
Symposium proceedings: Environmental aspects of fuel conversion technology, 3
[PB-282429/0] N78-33636
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0666/4] N78-33883
Assessment of the role of advanced technologies in small utilities
[EPRI-EM-696-VOL-2] N78-34008
Translations on USSR science and technology: Physical sciences and technology, no. 49
[JPRS-71896] N78-34028

TECHNOLOGY TRANSFER
Passing the threshold into the information age: Perspective for federal action on information. Volume 1: Basic findings report
[PB-281720/3] N78-33991
Passing the threshold into the information age: Perspective for federal action on information. Volume 2: Research report
[PB-281721/1] N78-33992
Science on its way to work: Activities of the National Bureau of Standards
[PB-282044/7] N78-34000
Technology utilization in a non-urban region: Further impact and technique of the Technology Use Center
[NASA-CR-157743] N78-34006

TECHNOLOGY UTILIZATION
ERDA facilities: A national resource for resolving energy problems
[ERDA-77-80] N78-33597
Legislatures and information systems. An overview and analysis of recent experience --- using computers for policy making in state government
[PB-282050/4] N78-33993
Legislatures and information systems: Challenges and responses in the states
[PB-282051/2] N78-33994

TECTONICS
Tectonic asymmetry of the earth and other planets
[NASA-TM-75576] N78-33643
Pulsations and expansion of the earth: A possible key to an understanding of its tectonic development and volcanism in the phanerozoic
N78-34033

TELECOMMUNICATION
A depolarization and attenuation experiment using the COMSTAR and CTS satellites
[NASA-CR-156848] N78-33287
Description of a model for evaluating operational performance of communications system
[AD-A057199] N78-33313
Communications for a mobile society: An assessment of new technology
[PB-281639/5] N78-33319
Organizing to use a new telecommunications technology: Communications satellites and vocational rehabilitation
[PB-282283/1] N78-33323
Planning telecommunications systems: A normative approach
N78-33866
Systems analysis of scientific and technical communication in the United States: Annex 2: The current practices
[PB-281849/0] N78-33988

TELEMETRY
Underground data acquisition and telemetry system
[AD-A056317] N78-33138
Telemetry test methods
[BDX-613-1811-REV] N78-33139
The 9438 low level traveling wave amplifier anomaly, revision A
[AD-A056714] N78-33344

TELEPHONY
Hardware design of a digital single-sideband generator
[AD-A057033] N78-33303

TELEVISION RECEIVERS
Relationship between noise figures and other performance characteristics of UHF TV receivers
[PB-281172/7] N78-33318

TEMPERATURE DISTRIBUTION
Feasibility study of acoustic ultrasonic flowmeters for solid/gas systems
[ANL-FE-49622-TM01] N78-33416
OTEC thermal resource report for Puerto Rico
[TID-27953] N78-33593

TEMPERATURE EFFECTS
Thermal and molecular effects on solid state behavior of rigid poly[vinylchloride]
N78-33227
The yield locus as a function of temperature for oriented and unoriented polycarbonate and polypropylene
N78-33473

TEMPERATURE GRADIENTS
Natural convection in a thermally stratified fluid
N78-33373
OTEC thermal resource report for Hawaii
[TID-27950] N78-33573

TEMPERATURE INVERSIONS
The growth and prediction of nocturnal inversions
[AD-A056993] N78-33682

TEMPERATURE MEASURING INSTRUMENTS
Aerial thermography for energy conservation
[NASA-TM-78959] N78-33510

TEMPERING
Long-term hot-hardness characteristics of five through-hardened bearing steels
[NASA-TP-1341] N78-33196

TENSILE DEFORMATION
High temperature cyclic deformation in nickel TD-nickel, and Al-4 percent Cu alloy aged to contain theta prime and theta double prime
N78-33190

TENSILE PROPERTIES
Effect of hydrostatic pressure on the deformation behavior of polyethylene and polycarbonate in tension and in compression
[AD-A056786] N78-33236

TENSORS
Optimal regulation of nonlinear systems by methods of tensor algebra
N78-33828

TERNARY ALLOYS
Electronic structure of ternary alloys --- iron-nickel-aluminum alloys
[AD-A056356] N78-33198

TERRAIN
Ecosystem mapping by interpretation of landscapes from satellite imagery
N78-33503

TEST EQUIPMENT
Solid State Data Acquisition and Processing System [SSDAPS]. Volume 3: Description, installation, calibration, and operating procedures --- for vehicle dynamics studies
[PB-282402/7] N78-33125
Telemetry test methods
[BDX-613-1811-REV] N78-33139
Laser far-field beam-profile measurements by the focal plane technique
[PB-281542/1] N78-33438

TEST FACILITIES
Operational testing of Air Force systems requires several improvements
[PB-281796/3] N78-33129
An investigation of the gaseous character of the atmosphere at the high energy laser test facility HELSTF at the White Sands Missile range [WSMR]
[AD-A056378] N78-33429
Lightweight laser mirror structural studies
[Y-DA-7472] N78-33437

TEST VEHICLES
Shake testing of vehicles through recorded simulation control scheme, volume 1
[AD-A056543] N78-33792
Recorded simulation control scheme: User's manual, volume 2, supplement
[AD-A056544] N78-33793

TESTS
Estimation and testing of hypotheses for distributions in accelerated life tests
[AD-A056096] N78-33465
Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 2
[AD-A056312] N78-33719

TEXTILES
Effects of ignition sources and fire retardants on material ignition
[PB-281451/5] N78-33184

THERMAL BLOOMING
Experimental determination of single and multiple pulse propagation
[AD-A055570] N78-33426

THERMAL BOUNDARY LAYER
The growth and prediction of nocturnal inversions
[AD-A056993] N78-33682

THERMAL CONDUCTIVITY
Measurement of the thermal conductivity of liquids
[PB-281706/2] N78-33183
Effects of ignition sources and fire retardants on material ignition
[PB-281451/5] N78-33184
Study of the effects of several variables on the thermal conductivity of 2 1/4 Cr-1 Mo steel
[ORNL-5313] N78-33219
Phonon thermal transport metallic glasses below 100 K
[COO-1198-1205] N78-33239
Tokamak confinement
[PPPL-1442] N78-33945
Phonon scattering by dislocations
N78-33949

THERMAL DEGRADATION
Methanation catalysts: Activity, adsorption and degradation studies of nickel and nickel bimetallic catalysts for methanation
N78-33161
Degradation studies of a trimethylolpropane triheptanoate lubricant basestock
[AD-A056825] N78-33237
Thermal degradation and termination behavior of thick film resistors
[SAND-77-1904] N78-33355

THERMAL ENERGY
Potential for cogeneration development in six major industries by 1985
[HCP/M60172-01/2] N78-33551
Engineering and economic feasibility of utilizing geothermal heat from the Heber reservoir for industrial processing purposes at Valley Nitrogen Producers Inc., El Centro agricultural chemical plant
[SAN-1323-3] N78-33562
OTEC thermal resource report for Hawaii
[TID-27950] N78-33573
Amorphous semiconductors in photovoltaic and solar thermal conversion
[BNL-24216] N78-33584

THERMAL MAPPING
Aerial thermography for energy conservation
[NASA-TM-78959] N78-33510

THERMAL STABILITY
Effect of radiation and acids on thermal stability of ion exchange resins
[RFP-2652] N78-33238
The morphology and stability of material phases
N78-33364

THERMAL STRESSES
Analysis of graphite/polyimide rail shear specimens subjected to mechanical and thermal loading
[NASA-CR-157769] N78-33481
Youngdahl stress functions and quasi-static nonaxisymmetric thermal stresses in a finite cylinder
[AD-A057196] N78-33485

THERMIONIC CONVERTERS
Monotone steady-state potential distributions in the standard collisionless plane diode model of the single-ended Q-machine --- thermionic converters
[UNICP-FSP-78/1] N78-33931

THERMISTORS
Analysis of conjunctive rocketborne inflatable sphere and bead thermistor soundings
[AD-A056943] N78-33662

THERMOCHEMISTRY
Solar-thermochemical production of hydrogen from water
[LA-UR-78-1052] N78-33586

THERMODYNAMIC PROPERTIES
Mechanical and thermal properties of sialon alumina composites
N78-33146
Thermodynamics of carbon in nickel-based multicomponent solid solutions
[ORNL/TM-6282] N78-33206

THERMODYNAMICS
Thermodynamic and transport properties of interstitial hydrogen isotopes in metal systems
[COO-3551-44] N78-33224
Optical measurement methods in thermogasdynamics
[NASA-TM-75333] N78-33915

THERMOPLASTIC RESINS
Thermoplastic rubber comprising ethylene-vinyl acetate copolymer, asphalt and fluxing oil
[NASA-CASE-NPO-88351] N78-33228
A study on thermoplastic structural foam --- dynamics of gas bubbles
N78-33229

THICK FILMS
Thermal degradation and termination behavior of thick film resistors
[SAND-77-1904] N78-33355

THICKNESS
Ellipsometric determination of properties of films on rough surfaces such as aluminum alloy aircraft skin
[AD-A056782] N78-33413

THIN FILMS
Size effects and electron microscopy of thin metal films
[NASA-CR-157746] N78-33194
Feasibility demonstration for electroplating ultra-thin polyimide film --- fabricating film for space erectable structures
[NASA-CR-157775] N78-33266
Surface cleaning in thin film technology
[SAND-77-1716C] N78-33269
Ellipsometric determination of properties of films on rough surfaces such as aluminum alloy aircraft skin
[AD-A056782] N78-33413
The growth and crystallographic characteristics of sulfide films on [111] copper investigated by RHEED
N78-33952
Thin-film metal-oxide-metal junction devices
N78-33953
Comparative studies of the steady state and RF properties of proximity effect bridges
N78-33961
Dielectric and optical properties of thin films --- birefrigent coatings
[AD-A056822] N78-33971
Optical and physical properties of evaporated PbS film
[SAND-79-0300] N78-33973

THIN LAYER CHROMATOGRAPHY
Analysis of impurities in composition B by thin layer chromatography
[AD-A056313] N78-33255

THIN PLATES
Analysis of elastic behavior of orthotropic wood composite plates
N78-33145
Measuring and predicting the dynamic effects of a confined thin metal plate pulse heated into the liquid-vapor regime
N78-33192
THREE DIMENSIONAL FLOW
Derivation and evaluation of an approximate analysis for three-dimensional viscous subsonic flow with large secondary velocities --- finite difference method
[NASA-CR-159430] N78-33044
THROATS
Dual throat thruster cold flow analysis
[NASA-CR-150822] N78-33142
THUNDERSTORMS
Two lightning-flash counter systems
[AD-A057369] N78-33655
Flight data of electric field thunderstorm research international project, trip 76, July 1976
[NASA-CR-15779] N78-33693
TIME DEPENDENCE
Creep-recovery constitutive equation and its time-independent limit
[CONF-780540-1] N78-33496
TIME LAG
Parameters of future ATC systems relating to airport capacity/delay
[AD-A057059] N78-33068
TIME SERIES ANALYSIS
Spectral analysis methods for noisy sampled-data systems
N78-33331
Forecasting and whitening filter estimation
[AD-A056540] N78-33836
TIME SHARING
Data director RTOS manual
[UCID-17750] N78-33799
TIN ALLOYS
Strain enhanced spheroidization and superplastic flow in a lead-tin eutectic alloy, part A. Development of a phenomenological equation for superplastic flow of fine grained materials, part B
N78-33188
TIP SPEED
Design and performance of a 427-meter-per-second-tip-speed two-stage fan having a 2.40 pressure ratio
[NASA-TP-1314] N78-33109
TISSUES (BIOLOGY)
Volume-restricted freezing of living cells and tissues
[ORNL/MIT-265] N78-33705
Tissue identification by ultrasound
[NASA-CR-157776] N78-33716
Physical mechanisms for biological effects of ultrasound
[PB-282234/4] N78-33725
TITANIUM ALLOYS
Effect of microstructure on fatigue properties of Ti-6Al-4V
N78-33189
Computer-aided design and manufacturing for extrusion of aluminum, titanium and steel structural parts. Phase 2: Application to practical extrusions. Volume 1: Description of CAD/CAM systems for extrusion of structural shapes
[AD-A056965] N78-33200
Computer-aided design and manufacturing for extrusion of aluminum, titanium and steel structural parts. Phase 2: Application to practical extrusions. Volume 2: User's manual for ALEXTR system of computer programs for design and manufacture of flat-face dies for aluminum extrusion
[AD-A056966] N78-33201
TITANIUM OXIDES
Laser induced fluorescence in titanium oxide: Lifetimes, collisions, and intercombinations
N78-33925
TOKAMAK DEVICES
Excitation of large amplitude plasma waves by runaway electrons --- tokamak devices
[AD-A056788] N78-33934
Finite beta toroidal plasmas
[ORNL/TM-6273] N78-33938
Review of instability theory for high pressure Tokamak plasma
[ORNL/TR-4610] N78-33939
Tritium Systems Test Facility
[MLM-2500] N78-33940
Tokamak confinement
[PPPL-1442] N78-33945
TOLERANCES (PHYSIOLOGY)
The lumbosacral segment as a vulnerable region in various postures
[NASA-TM-75579] N78-33713
TOMOGRAPHY
Quantitative organ visualization
N78-33708
TOPOGRAPHY
Ecosystem mapping by interpretation of landscapes from satellite imagery
N78-33503
Geographic data display
[AD-A056101] N78-33514
Radar observations of a volcanic terrain: Askja Caldera, Iceland
[NASA-CR-157765] N78-33645
TORNADOES
Investigation of HEPA filters subjected to tornado pressure pulses: Initial structural testing
[LA-7202-MS] N78-33394
TOROIDAL PLASMAS
Finite beta toroidal plasmas
[ORNL/TM-6273] N78-33938
Review of instability theory for high pressure Tokamak plasma
[ORNL/TR-4610] N78-33939
TORQUE
Torque ripple in a vertical axis wind turbine
[SAND-78-0577] N78-33596
TORUSES
Kinetic transport properties of a bumpy torus with finite radial ambipolar field
[ORNL/TM-6215] N78-33942
TOXIC HAZARDS
Assessment of industrial hazardous waste practices, rubber and plastics industry: Plastic materials and synthetics industry
[PB-282071/0] N78-33271
Assessment of industrial hazardous waste practices, rubber and plastics industry: Rubber products industry
[PB-282072/8] N78-33272
Assessment of industrial hazardous waste practices, rubber and plastics industry: Appendices
[PB-282073/6] N78-33273
TOXICOLOGY
Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 1
[AD-A056311] N78-33718
Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 2
[AD-A056312] N78-33719
TRACE ELEMENTS
Sub-part-per-trillion detection of organics in aqueous solution by laser induced molecular fluorescence
[UCRL-80038] N78-33174
TRACERS
Classification testing of composition A5 and selected pyrotechnics
[NASA-CR-157744] N78-33251
TRACHEA
Micro-fluid exchange coupling apparatus --- a microrespirator to allow surgery on rats or mice
[NASA-CASE-ARC-11114-1] N78-33717
TRAFFIC CONTROL
Network aggregation in transportation planning. Volume 2: A fixed point method for treating traffic equilibria
[PB-281385/5] N78-34012
TRAILERS
An investigation of drag reduction for tractor trailer vehicles
[NASA-CR-144877] N78-33444
TRAINING DEVICES
Air Force aircrew training devices: Master plan
[AD-A056940] N78-33734
TRAJECTORIES
Measurements in the turbulent boundary layer of a yawed, spinning body of revolution at Mach 3.0 with a laser velocimeter and impact probe
[AD-A057237] N78-33059
TRANSFER FUNCTIONS
Spectral distortion measures for speech compression
[AD-A056853] N78-33316
TRANSFORMATIONS
Techniques for digital data transformation and monitoring
[SAND-77-1604C] N78-33800
TRANSFORMATIONS (MATHEMATICS)
The Gini index, the Lorenz curve, and the total time on test transforms
[AD-A056095] N78-33466
A note on ancillarity and independence via model-preserving transformations
[AD-A056344] N78-33870
TRANSIENT PRESSURES
Transient flow of non-Newtonian power-law fluids in porous media
N78-33374
TRANSIENT RESPONSE
A study of the effect of the rotor coil couplings of a synchronous machine on its predicted transient response
N78-33330
TRANSISTORS
Current voltage characteristics of gallium-arsenide metal epitaxial semiconductor field effect transistors at cryogenic temperatures
N78-33337
The present situation and forecasts of semiconductor elements performance within the microwave range, 1970-1985
[NASA-TM-75453] N78-33338
Transistor step stress testing program, JANTX 2N2905A
[NASA-CR-150821] N78-33341
Superconducting transistor
[CONF-780339-1] N78-33359
Active devices for high temperature microcircuitry
[SAND-77-1145] N78-33414
TRANSITION METALS
Thermodynamic and transport properties of interstitial hydrogen isotopes in metal systems
[COO-3551-44] N78-33224
Experimental and theoretical study of the surface states/surface resonances on the [100] faces of group VIP transition metals
N78-33964
TRANSITION PROBABILITIES
Measurement of transition probabilities for Mn I lines and the manganese solar abundance
N78-33890
TRANSITION TEMPERATURE
The specific heat of helium four near the superfluid transition in a confined geometry
N78-33966
TRANSLATIONAL MOTION
Magnetic bubble domain wall dyanmics in gradient translation
N78-33334
TRANSMISSION FLUIDS
Solar heat transport fluid
[NASA-CR-150806] N78-33530
TRANSMISSION LINES
Excitation of current on an infinite horizontal wire over the earth by an arbitrary electric dipole source
[AD-A057257] N78-33346
Electrical and biological effects of transmission lines: A review
[BPA-BIO-77-1] N78-33722
TRANSONIC FLOW
A comparative study of two computational methods for calculating unsteady transonic flows about oscillating airfoils
[AD-A056946] N78-33058
TRANSONIC SPEED
Aerodynamic load distributions at transonic speeds for a close-coupled wing-canard configuration: Tabulated pressure data
[NASA-TM-78780] N78-33045
An investigation of wing buffeting response at subsonic and transonic speeds: Phase 1: F-111A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152109] N78-33113
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152110] N78-33114
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Vchume 3: Tabulated power spectra
[NASA-CR-152111] N78-33115
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2 F-3A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152112] N78-33116
TRANSPONDERS
The FAA concept for a Beacon Collision Avoidance System (BCAS). Volume 1: Executive summary
[AD-A056930] N78-33072
Radio propagation via transponder
[AD-A056899] N78-33306
TRANSPORT AIRCRAFT
Prospects for a civil/military transport aircraft
[NASA-TM-78724] N78-33060
Wing planform geometry effects on large subsonic military transport airplanes
[AD-A056124] N78-33088
TRANSPORT PROPERTIES
Thermodynamic and transport properties of interstitial hydrogen isotopes in metal systems
[COO-3551-44] N78-33224
Vapor transport mechanisms
[NASA-CR-150824] N78-33383
Electron transport code theoretical basis
[LA-7227-MS] N78-33900
Anomalous transport coefficients due to the ion-ion two-stream plasma microinstability
[AD-A056542] N78-33930
Kinetic transport properties of a bumpy torus with finite radial ambipolar field
[ORNL/TM-6215] N78-33942
Growth and characterization of semi-insulating GaN thin films
N78-33954
TRANSPORTATION ENERGY
Environmental development plan for the Division of Transportation energy conservation, 1977
[DOE/EDP-0018] N78-33556
Fuel consumption: Transportation, volume 1. A bibliography with abstracts
[NTIS/PS-78/0707/6] N78-33599
Fuel consumption: Transportation, volume 2. A bibliography with abstracts
[NTIS/PS-78/0708/4] N78-33600

TRAPPED PARTICLES
Effect of a dc electric field on beam trapping
[AD-A056789] N78-33354
TRAVELING WAVE TUBES
Thermal characteristics of the 12-gigahertz, 200-watt output stage tube for the communications technology satellite
[NASA-TP-1344] N78-33137
The 9438 low level traveling wave amplifier anomaly, revision A
[AD-A056714] N78-33344
TRAVELING WAVES
Multidimensional nonlinear Langmuir waves
[AD-A056851] N78-33937
TREES [MATHEMATICS]
CAT: A computer code for the automated construction of fault trees
[EPRI-NP-705] N78-33801
TRIMETHYL COMPOUNDS
Degradation studies of a trimethylolpropane triheptancate lubricant basestock
[AD-A056825] N78-33237
TRITIUM
Tritium Systems Test Facility
[MLM-2500] N78-33940
TROPICAL REGIONS
Development of heavily vegetated area in Brazil
[E78-10157] N78-33507
TROPOSPHERIC SCATTERING
Tropospheric scatter communications. A bibliography with abstracts
[NTIS/PS-78/0718/3] N78-33322
TTL INTEGRATED CIRCUITS
Digroup data reduction system
[AD-A056986] N78-33304
TUNGSTEN
Desorption and surface diffusion: Nitrogen on tungsten [110]
[AD-A056346] N78-33165
Electron-spin polarization in low energy electron diffraction from tungsten [001]
N78-33960
TUNGSTEN ALLOYS
Brillouin scattering from tungsten bronze materials
N78-33955
TUNNELING
Superconducting transistor
[CONF-780339-1] N78-33359
TURBINE BLADES
Stress analysis of ceramic turbine blades by finite element method, part 1
[AD-A056310] N78-33111
TURBINE ENGINES
Evaluation of cyclic behavior of aircraft turbine disk alloys
[NASA-CR-159433] N78-33478
TURBINE WHEELS
Nondestructive evaluation of steam turbine rotors: An analysis of the systems and techniques utilized for inservice inspection
[EPRI-NP-744] N78-33469
TURBINES
Torque ripple in a vertical axis wind turbine
[SAND-78-0577] N78-33596
TURBOFAN ENGINES
Pollution Reduction Technology Program for small jet aircraft engines, phase 2
[NASA-CR-159415] N78-33104
DYGABCD: A program for calculating linear A, B, C, and D matrices from a nonlinear dynamic engine simulation
[NASA-TP-1295] N78-33110
TURBOFANS
Performance of a transonic fan stage designed for a low meridional velocity ratio
[NASA-TP-1298] N78-33107
TURBOJET ENGINES
Turbine engine particulate emission characterization, phase 2
[AD-A057370] N78-33106
DYGABCD: A program for calculating linear A, B, C, and D matrices from a nonlinear dynamic engine simulation
[NASA-TP-1295] N78-33110
TURBOMACHINERY
Design and performance of a 427-meter-per-second-tip-speed two-stage fan having a 2.40 pressure ratio
[NASA-TP-1314] N78-33109
A study of the effect of the rotor coil couplings of a synchronous machine on its predicted transient response
N78-33330
TURBULENCE
Experimental analysis and computation of the onset and development of the boundary layer transition
[NASA-TM-75325] N78-33041
TURBULENT BOUNDARY LAYER
Oblique shock wave/turbulent boundary layer interactions in three dimensions at Mach 3, part 2
[AD-A057010] N78-33056
Thick axisymmetric boundary layer and near wake of a low-drag body of revolution
[AD-A057158] N78-33057
Measurements in the turbulent boundary layer of a yawed, spinning body of revolution at Mach 3.0 with a laser velocimeter and impact probe
[AD-A057237] N78-33059
Direct measurements and analysis of skin friction and cooling downstream of multiple flush-slot injection into a turbulent Mach 6 boundary layer
[NASA-TP-1176] N78-33385
A visual investigation of turbulence in stagnation flow about a circular cylinder
[NASA-CR-3019] N78-33386
An investigation of the boundary layer of an axisymmetric mesoscale vortex
[PB-282507/3] N78-33687
TURBULENT FLOW
An investigation of phase change problems: A: Melting of a semi-transparent medium including radiation effects; B: Transient freezing of turbulent flow inside tubes
N78-33368
Measurement and analysis of flow in ducts and rod bundles
N78-33377
Experimental study of chemically reacting turbulent free shear layers
[FE-2446-4] N78-33398
TWO DIMENSIONAL FLOW
Theory, computer program, and illustrative examples for the two-dimensional boundary layer flow of ideal gases
[AD-A056308] N78-33390
A finite element method for problems involving the Helmholtz equation in two dimensional exterior regions
N78-33823
TWO PHASE FLOW
Numerical simulation of two-phase flow in vertical pipes
N78-33366
A photographic technique to obtain droplet and flow pattern data in two-phase flow for use in modeling
N78-33371
Local measurements in two-phase liquid-metal MHD
[CONF-780336-2] N78-33943

U

U.S.S.R.
Translations on USSR science and technology: Physical sciences and technology, no. 49
[JPRS-71896] N78-34028
U.S.S.R. SPACE PROGRAM
From space on a parachute
[NASA-TM-75577] N78-33140
UH-1 HELICOPTER
Bell UH-1H RAM/LOG report
[AD-A057231] N78-33091
ULTRAHIGH FREQUENCIES
Relationship between noise figures and other performance characteristics of UHF TV receivers
[PB-281172/7] N78-33318
ULTRASONIC AGITATION
Effect of ultrasonic waves on the kinetics of polymerization
N78-33226
ULTRASONIC FLAW DETECTION
Flaw location and characterization in anisotropic materials by ultrasonic spectral analysis
[CONF-780427-1] N78-33880
ULTRASONIC RADIATION
Physical mechanisms for biological effects of ultrasound
[PB-282234/4] N78-33725
Raleigh-like reflection of ultrasonic waves at a liquid-solid layer-solid interface
[AD-A056975] N78-33878
Acoustic holography. Citations from the NTIS data base
[NTIS/PS-78/0700/1] N78-33885
Acoustic holography. Citations from the engineering index data base
[NTIS/PS-78/0701/9] N78-33886
ULTRASONIC TESTS
Feasibility of ultrasonic Rayleigh waves for the detection of corrosion beneath paint
[AD-A056643] N78-33199
High temperature, noncontact material testing --- ultrasonic tests of elastic materials using pulsed lasers
[UCRL-80438] N78-33212
Improved ultrasonic nondestructive testing of pressure vessels
[PB-282170/0] N78-33470
Tissue identification by ultrasound
[NASA-CR-157776] N78-33716
ULTRASONIC WAVE TRANSDUCERS
Engineering services to determine acceptance limits of ultrasonic transducers for nondestructive inspection
[AD-A056648] N78-33464
ULTRASONICS
Ultrasonic lubrication
[AD-A056050] N78-33448
ULTRAVIOLET RADIATION
The preventive role of ultraviolet radiation during exposure to ionizing radiation
[NASA-TM-75106] N78-33710
UNDERGROUND STRUCTURES
Underground data acquisition and telemetry system
[AD-A056317] N78-33138
UNDERWATER ACOUSTICS
Mathematical analysis of effects of underwater sound-source motion on received total acoustic field
N78-33272
Revised simplified formulae for calculating the speed of sound in sea water
[AD-A056556] N78-33877
UNDERWATER ENGINEERING
Drag reducing fluids. A bibliography with abstracts
[NTIS/PS-78/0730/8] N78-33402
UNDERWATER EXPLOSIONS
Explosion effects and properties. Part 2: Explosion effects in water
[AD-A056694] N78-33254
Vulnerability of surface effect vehicles to explosion generated water waves
[AD-A055503] N78-33267
UNITED STATES OF AMERICA
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 1: Executive summary
[AD-A056740] N78-33074
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 2: Analysis
[AD-A056741] N78-33075
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirements of CONUS, Alaska, and offshore. Volume 3: Supporting appendices
[AD-A056742] N78-33076
UNSTEADY FLOW
A comparative study of two computational methods for calculating unsteady transonic flows about oscillating airfoils
[AD-A056946] N78-33058
UPPER ATMOSPHERE
Theoretical study of background radiance in upper atmosphere
[AD-A057249] N78-33663
UPSTREAM
A numerical study of upstream blocking and internal waves in a density stratified fluid
N78-33370
UPWELLING WATER
Laboratory and field measurements of upwelled radiance and reflectance spectra of suspended James River sediments near Hopewell, Virginia
[NASA-TP-1292] N78-33616
URANIUM
NURE geochemical investigations in the eastern United States
[DP-MS-77-101] N78-33517
Manual for the application of NURE 1974-1977 aerial gamma-ray spectrometer data
[GJBX-13-78] N78-33519
Projects to expand fuel sources in Eastern states: An update of Information Circular 8725. Survey of Planned or proposed coal mines, coal and noncoal conversion plants, electric generating plants, oil refineries, uranium enrichment facilities, and related infrastructure, in states east of the Mississippi River (as of July 1977)
[BM-IC-8765] N78-33581
The ionization of uranium atoms by electron impact
N78-33894
Lattice dynamics of alpha uranium
N78-33967
URBAN DEVELOPMENT
Federal-assistance programs and energy-development-impacted municipalities
[FEA/D-77/039] N78-33549
Environmental development plan for buildings and community systems, 1977
[DOE/EDP-0020] N78-33622
URBAN PLANNING
Urban noise pollution. A bibliography with abstracts
[NTIS/PS-78/0686/2] N78-33634
URBAN TRANSPORTATION
San Diego wheelchair accessible bus study
[PB-281087/7] N78-34010
Network aggregation in transportation planning Volume 1: Summary and survey
[PB-281384/8] N78-34011
Network aggregation in transportation planning. Volume 2: A fixed point method for treating traffic equilibria
[PB-281385/5] N78-34012
USER MANUALS (COMPUTER PROGRAMS)
Interactive composite joint design. Part 2: User's manual
[AD-A056712] N78-33449
Container cushioning design engineer users manual: CDC-6600 FORTRAN version, volume 2
[AD-A057245] N78-33451
User's guide for PAL A Guassian-plume algorithm for point, area, and line sources
[PB-281306/1] N78-33627

TRAV10 horizontal network adjustment program
[PB-283087/5] N78-33668
Acoustic sounder array for application to air pollution. Volume 1: Executive summary and user guide
[PB-282064/3] N78-33670
Guide to a condensed form of NASTRAN
[NASA-RP-1019] N78-33791
Recorded simulation control scheme: User's manual, volume 2, supplement
[AD-A056544] N78-33793
Data director RTOS manual
[UCID-17750] N78-33799
Table producing languages, version 4.0: Users guide. Including codebook language
[PB-281378/0] N78-33804
User's manual for the BRL subroutine to calculate Bessel functions of integral order and complex argument
[AD-A056369] N78-33838
Project RMAC: Symbolic logic retrieval users guide
[PB-281374/9] N78-33980
USER REQUIREMENTS
Management information system for ESD program offices
[AD-A056103] N78-33977
ESCOE information retrieval system. System description and operation --- information needs of engineers
[FE-2468-26] N78-33985
UTILITIES
Assessment of the fuel cell's role in small utilities
[EPRI-EM-696-VOL-1] N78-33576
UTILIZATION
Contingency plans for chromium utilization. Publication NMAB-335
[NASA-CR-157789] N78-33207

V

V/STOL AIRCRAFT
A study of alternatives for VSTOL computer systems
[AD-A056105] N78-33098
VANADIUM
Nearest neighbor spacings of clean vanadium surfaces from extended appearance potential fine structure
[AD-A057142] N78-33202
Extended fine structure above vanadium L-shell appearance potential thresholds
[AD-A057141] N78-33203
VANADIUM ALLOYS
Effect of microstructure on fatigue properties of Ti-6Al-4V
N78-33189
VAPOR PHASES
Forced flow laminar filmwise condensation of a pure saturated vapor in a vertical tube
N78-33367
VAPORS
Vapor transport mechanisms
[NASA-CR-150824] N78-33383
VARIABLE
On the radiation damping of high externally resonant electromagnetic systems
[AD-A056316] N78-33317
VARIANCE (STATISTICS)
Robustness of the MINQUE procedure in estimating variance components
N78-33853
VEGETATION
Development of heavily vegetated area in Brazil
[E78-10157] N78-33507
VEHICLES
Pulsed holographic analysis of large vibrating vehicle components
[AD-A056439] N78-33410
VELOCITY DISTRIBUTION
Experimental analysis and computation of the onset and development of the boundary layer transition
[NASA-TM-75325] N78-33041
VENERA SATELLITES
Radiophysical investigations of Venus from spacecraft --- radio emission from Venus and the Sun
[NASA-TM-75578] N78-34017
VENUS (PLANET)
Tectonic asymmetry of the earth and other planets
[NASA-TM-75576] N78-33643
VENUS ATMOSPHERE
Radiophysical investigations of Venus from spacecraft --- radio emission from Venus and the Sun
[NASA-TM-75578] N78-34017
VERTEBRAL COLUMN
The lumbosacral segment as a vulnerable region in various postures
[NASA-TM-75579] N78-33713
VIBRATION
Convection induced by G-jitter in rectangular enclosures aboard spacecraft
N78-33084
VIBRATION MEASUREMENT
Pulsed holographic analysis of large vibrating vehicle components
[AD-A056439] N78-33410
VIDEO DATA
Instrumentation development of Raster scanning densitometer
[AD-A056968] N78-33309
VIKING LANDER SPACECRAFT
Dust adhesion on Viking lander camera window
[NASA-TM-78782] N78-33407
VIRGINIA
Laboratory and field measurements of upwelled radiance and reflectance spectra of suspended James River sediments near Hopewell, Virginia
[NASA-TP-1292] N78-33616
VISCOELASTICITY
Rayleigh-Brillouin scattering and structural relaxation of a viscoelastic liquid
[AD-A056763] N78-33389
VISCOSITY
Viscous entrainment of mass and energy in fluid dynamic energy separation
[PB-281759/1] N78-33401
VISCOUS FLOW
A viscous-inviscid interactive compressor calculation
N78-33040
Viscous entrainment of mass and energy in fluid dynamic energy separation
N78-33376
VISUAL FIELDS
Illumination requirements for target recognition and reacquisition as a function of field of view --- visual tasks
[AD-A057235] N78-33252
VISUAL PERCEPTION
The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain
N78-33701
Quantitative predictions of length in the Mueller-Lyer illusion as perceived by the human visual system
[AD-A055706] N78-33732
VISUAL STIMULI
Hysteresis in human binocular fusion: A second look
N78-33711
VISUAL TASKS
Illumination requirements for target recognition and reacquisition as a function of field of view --- visual tasks
[AD-A057235] N78-33252
VOICE COMMUNICATION
Hardware design of a digital single-sideband generator
[AD-A057033] N78-33303
Spectral distortion measures for speech compression
[AD-A056853] N78-33316
VOLATILITY
Vapor-liquid equilibria in multicomponent aqueous solutions of volatile electrolytes
N78-33157
VORTICES
Laser-velocimeter surveys of merging vortices in a wind tunnel: Complete data and analysis
[NASA-TM-78449] N78-33043
Vortex advisory system simulation of Chicago O'Hare Airport
[AD-A057112] N78-33069
An investigation of the boundary layer of an axisymmetric mesoscale vortex
[PB-282507/3] N78-33687
VULNERABILITY
Vulnerability of surface effect vehicles to explosion generated water waves
[AD-A055503] N78-33267

W

WAKES
Thick axisymmetric boundary layer and near wake of a low-drag body of revolution
[AD-A057158] N78-33057
WARNING SYSTEMS
Statistical models for seismic magnitude
[AD-A056140] N78-33658
National Severe Storms Laboratory: History and FY 1976 program
[PB-282665/9] N78-33688
National hurricane operations plan
[PB-282838/2] N78-33689
WASTE DISPOSAL
Assessment of industrial hazardous waste practices, rubber and plastics industry: Executive summary
[PB-282070/2] N78-33270
Assessment of industrial hazardous waste practices, rubber and plastics industry: Plastic materials and synthetics industry
[PB-282071/0] N78-33271
Assessment of industrial hazardous waste practices, rubber and plastics industry: Rubber products industry
[PB-282072/8] N78-33272
Assessment of industrial hazardous waste practices, rubber and plastics industry: Appendices
[PB-282073/6] N78-33273
Significance of process variables on liquid effluent production in coal gasification
N78-33525
A recycled-water sanitary waste disposal system
N78-34004
Multi-objective analysis applied to areawide wastewater management
N78-34005
WASTE ENERGY UTILIZATION
Potential for cogeneration development in six major industries by 1985
[HCP/M60172-01/2] N78-33551
WATER
Fast reactions of aluminum: A literature review
[AD-A057215] N78-33433
Design package for a complete residential solar space heating and hot water system
[NASA-CR-150795] N78-33531
Solar-thermochemical production of hydrogen from water
[LA-UR-78-1052] N78-33586
WATER CIRCULATION
A recycled-water sanitary waste disposal system
N78-34004
WATER COLOR
A Nimbus G pre-launch field experiment in the Gulf of Mexico, October 1977
[NASA-CR-157786] N78-33509
WATER EROSION
Relationships of clay mineralogy to landscape stability in Western Oregon
N78-33500
WATER MANAGEMENT
Multi-objective analysis applied to areawide wastewater management
N78-34005
WATER POLLUTION
Significance of process variables on liquid effluent production in coal gasification
N78-33525
Laboratory and field measurements of upwelled radiance and reflectance spectra of suspended James River sediments near Hopewell, Virginia
[NASA-TP-1292] N78-33616
Quantitative mapping by remote sensing of an ocean acid-waste dump
[NASA-TP-1275] N78-33617
Hazardous material spills: A documentation and analysis of historical data
[PB-281090/1] N78-33631
WATER QUALITY
Biological water quality monitoring using chemiluminescent and bioluminescent techniques
[NASA-CR-156830] N78-33702
WATER RESOURCES
Radar target remotely sensing hydrological phenomena
[NASA-CASE-LAR-12344-1] N78-33511
WATER TEMPERATURE
Investigation of alternate types of water-storage components to be utilized in conjunction with the ACES system
[ORNL/SUB-78/14233/1] N78-33578
Annual and seasonal maps of the residual temperature in the upper waters of the western North Pacific from 1954 - 1974
[PB-281212/1] N78-33699
WATER VAPOR
An experimental investigation of the critical supersaturation of five vapors in a shock tube --- Freon benzene, carbon tetrachloride, water and heavy water
[AD-A056859] N78-33172
WATER WAVES
Vulnerability of surface effect vehicles to explosion generated water waves
[AD-A055503] N78-33267
WATERSHEDS
Nitrate and phosphorus runoff losses from small watersheds in Great Lakes Basin
[PB-281275/8] N78-33633
WAVE DIFFRACTION
Source radiation in the presence of smooth convex bodies
[AD-A056645] N78-33296
WAVE EQUATIONS
Multidimensional nonlinear Langmuir waves
[AD-A056851] N78-33937
WAVE EXCITATION
High frequency behavior of source excited concave surfaces
N78-33475
Impedance measurement using a two-microphone, random-excitation method
[NASA-TM-78785] N78-33875
Excitation of large amplitude plasma waves by runaway electrons --- tokamak devices
[AD-A056788] N78-33934

WAVE PROPAGATION
The phase of the crosspolarized signal generated by millimeter wave propagation through rain
[NASA-CR-156841] N78-33288
A numerical study of upstream blocking and internal waves in a density stratified fluid
N78-33370

WAVEFORMS
Programmed-waveform pulse-width modulation techniques for the control of converter harmonics
N78-33335

WAVEGUIDES
ELF propagation in a non-stratified earth-ionosphere waveguide
[AD-A056143] N78-33295
Mutual coupling analysis in a finite planar rectangular waveguide antenna
[AD-A056858] N78-33315

WEAPON SYSTEMS
Operational testing of Air Force systems requires several improvements
[PB-281796/3] N78-33129
Investigation into the effects of weapon setback on various materials and geometries
[AD-A057236] N78-33450

WEATHER FORECASTING
Rain scavenging studies
[COO-1407-65] N78-33676
Tailored climatology of severe weather --- computerized simulation
[AD-A056988] N78-33679
Development of techniques for short-range precipitation forecasts
[AD-A057153] N78-33680
Climate forecast verification via multinomial stochasters
[AD-A056920] N78-33681
National hurricane operations plan
[PB-282838/2] N78-33689
An operational message composition system using the NWS Automatic Data Acquisition System [ADAS] computer system
[PB-283088/3] N78-33691
Fog prediction. A bibliography with abstracts
[NTIS/PS-78/0775/3] N78-33694

WEATHER RECONNAISSANCE AIRCRAFT
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, fall 1976
[AD-A057144] N78-33660

WEIBULL DENSITY FUNCTIONS
Progressive censoring on four-parameter Weibull distribution
N78-33852

WEIGHT REDUCTION
Advanced program weight control system
N78-33779
A data management system for weight control and design-to-cost
N78-33780

WELD STRENGTH
Residual stresses at weld repairs in pressure vessels
[PB-281853/2] N78-33497

WELD TESTS
Report on work performed under P. O. 9667503, task 2
[UCRL-13829] N78-33268

WELLS
Geothermal well completions: An overview of existing methods in four types of developments
[SAND-78-7010] N78-33580

WHISTLERS
Test particle correlation by a whistler wave in a nonuniform magnetic field
[AD-A057065] N78-33302

WIND [METEOROLOGY]
The estimation of air concentrations due to the diffusion, deposition and resuspension of contaminants by the wind
N78-33674
National Severe Storms Laboratory: History and FY 1976 program
[PB-282665/9] N78-33688

WIND EFFECTS
Further studies of sunlight glitter on a wind-ruffled sea --- oil slicks
[AD-A056850] N78-33917

WIND SHEAR
The analysis of National Transportation Safety Board small multiengine fixed-wing aircraft accident/incident reports for the potential presence of low-level wind shear
[AD-A056780] N78-33063

WIND TUNNEL MODELS
An investigation of drag reduction for tractor trailer vehicles
[NASA-CR-144877] N78-33444

WIND TUNNEL STABILITY TESTS
Nonlinear rolling motion analysis of a Canard-controlled missile configuration at angles of attack from 0 to 30 degrees in incompressible flow
[AD-A056695] N78-33132

WIND TUNNEL TESTS
Laser-velocimeter surveys of merging vortices in a wind tunnel: Complete data and analysis
[NASA-TM-78449] N78-33043

WIND TUNNELS
Static pressure orifice system testing and apparatus
[NASA-CASE-LAR-12269-1] N78-33123

WIND VELOCITY
Remote sensing of atmospheric water vapor, liquid water and wind speed at the ocean surface by passive microwave techniques from the Nimbus-5 satellite
[NASA-TM-79568] N78-33512

WIND VELOCITY MEASUREMENT
Low-layer features of two limited-area hurricane regimes
[PB-283079/2] N78-33690

WINDMILLS [WINDPOWERED MACHINES]
Torque ripple in a vertical axis wind turbine
[SAND-78-0577] N78-33596

WINDOWS [APERTURES]
Dust adhesion on Viking lander camera window
[NASA-TM-78782] N78-33407

WINDPOWER UTILIZATION
Federal wind energy program. Program summary
[DOE/ET-0023/1] N78-33594

WINDSHIELDS
Aircraft defogging and defrosting [transparent area]
[AD-A056976] N78-33094

WING PLANFORMS
Aerodynamic load distributions at transonic speeds for a close-coupled wing-canard configuration: Tabulated pressure data
[NASA-TM-78780] N78-33045
Wing planform geometry effects on large subsonic military transport airplanes
[AD-A056124] N78-33088

WINGS
Assessment of load alleviation devices installed on a power-augmented-ram wing over irregular waves
[AD-A045425] N78-33049
Aerodynamic derivatives for an oblique wing aircraft estimated from flight data by using a maximum likelihood technique
[NASA-TP-1336] N78-33054
An investigation of wing buffeting response at subsonic and transonic speeds: Phase 1: F-111A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152109] N78-33113
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152110] N78-33114
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152111] N78-33115
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2 F-3A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152112] N78-33116

WIRE
Wire-scanner reentering experiment error estimates
[LA-6959-MS] N78-33418

WOOD
Analysis of elastic behavior of orthotropic wood composite plates
N78-33145

WORKLOADS [PSYCHOPHYSIOLOGY]
Adaptation of time line analysis program to single pilot instrument flight research
[NASA-TM-78748] N78-33731

X

X RAY ANALYSIS
X-ray analysis of biological specimens
[UR-3490-1341] N78-33704

X RAY FLUORESCENCE
X ray fluorescence analysis, volume 2. A bibliography with abstracts
[NTIS/PS-78/0722/5] N78-33185

X RAY SPECTRA
Electronic structure of ternary alloys --- iron-nickel-aluminum alloys
[AD-A056356] N78-33198
X ray spectra of X Per --- oso-8 observations
[NASA-TM-79646] N78-34013

XENON
Research in laser processes
[AD-A056030] N78-33427

XENON LAMPS
Interaction of Xenon light with the surface of 304 stainless steel
[RFP-2647] N78-33205

Y

YAG LASERS
Neodymium YAG lasers. A bibliography with abstracts
[NTIS/PS-78/0808/2] N78-33441

YF-16 AIRCRAFT
Mechanization of blended A sub N mode for CCV YF-16
[AD-A056553] N78-33089

YTTRIUM OXIDES
Microstructurally developed toughening mechanisms in ceramics. Stress induced martensitic reaction. 2: Experiments in the ZRO2-Y2-O3 system
[AD-A057240] N78-33232

YTTRIUM-ALUMINUM GARNET
Neodymium YAG lasers. A bibliography with abstracts
[NTIS/PS-78/0808/2] N78-33441

Z

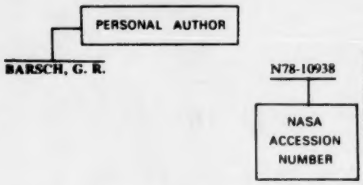
ZINC
Transient and failure analyses of porous zinc electrodes
N78-33187
Development of high-efficiency cost-effective, zinc-chlorine batteries for utility peak-shaving, 1976
[EPRI-EM-711] N78-33590

ZINC OXIDES
Early stages of the oxidation of metal surfaces --- photoelectron spectroscopy of zinc oxide
[NASA-CR-157767] N78-33195

ZIRCONIUM OXIDES
Microstructurally developed toughening mechanisms in ceramics. Stress induced martensitic reaction. 2: Experiments in the ZRO2-Y2-O3 system
[AD-A057240] N78-33232

PERSONAL AUTHOR INDEX

Typical Personal Author Index Listing



Listings in this Index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

AABERG, R. L. N78-33546
AAMODT, R. E. N78-33941
ABBASCHIAN, G. J. N78-33204
ABENS, S. G. N78-33541
ADDY, A. L. N78-33390
ADLER, L. N78-33880
AGGSON, T. L. N78-33339
AHN, U. N78-33859
AKIMA, H. N78-33324
AKUIYIBO, D. B. N78-33366
AL-KHALIDI, A. S. R. N78-33848
ALBERY, W. B. N78-33740
N78-33741
ALDRICH, K. A. N78-33742
ALDRICH, R. E. N78-33971
ALESSIO, F. J. N78-33547
ALEXANDER, L. N78-33506
ALLCOCK, H. R. N78-33168
ALLEN, C. W. N78-33222
ALPERT, J. C. N78-33673
ALTAN, T. N78-33200
N78-33201
AMENTEA, R. N78-33326
ANDERSON, C. L. N78-33968
ANDERSON, G. L. N78-33849
ANDERSON, J. H. N78-33434
N78-33435
ANDERSON, L. M., JR. N78-33902
ANDERSON, N. E. N78-33196
ANDERSON, O. L. N78-33044
ANDERSON, W. J. N78-33445
ANDO, M. E. N78-33174
ANDRADE, A. D. N78-33358
ANDREAS, R. D. N78-33083
ANSON, J. N78-33595
ANTONIAK, Z. I. N78-33524
ANTONIUK, D. N78-33379
AOKI, H. N78-33507
APOSTOLAKIS, G. E. N78-33801
ARBER, S. L. N78-33728
ARD, W. B. N78-33946
ARGUELLO, M. D. N78-33179
ARMSTRONG, G. T. N78-33760
ARMSTRONG, R. D. N78-33796
ARNAL, D. N78-33041
ARNOLD, C. R. N78-33813
ARONSON, J. R. N78-34020
ARUTUNIAN, G. N78-33410
ASCHER, S. N78-33850
ASHCROFT, N. W. N78-33381
AUER, G. N78-33931
AUFDERHAAR, G. C. N78-33683
AVRAM, H. D. N78-33983
AYER, F. A. N78-33636
AYLOR, J. H. N78-33502
AZAROFF, L. V. N78-33198

B

BACKMAN, D. G. N78-33204
BACKSTROM, R. C. N78-33930
BAGWELL, J. W. N78-33283
BAIN, W. L., JR. N78-33810
BAIRD, J. E. N78-33851
BAKER, K. B. N78-34015
BAKER, W. E. N78-33685
BALLARD, H. N. N78-33656
BALLIF, J. L. N78-33180
BANTA, H. N78-33649
BARACK, W. N. N78-33101
BARBARIKA, H. F. N78-33637
BARR, R. N78-33869
BARRETT, M. F. N78-33081
N78-33082
BARTELT, J. L. N78-33343
BASS, B. G. N78-33701
BATEMAN, G. N78-33938
BATTISTE, R. L. N78-33490
BAUM, M. A. N78-34000
BAXTER, R. C. N78-33192
BAXTER, T. N78-33692
BEANDER, B. S. G. N78-33775
BECHTOLD, R. L. N78-33261
BECKER, J. N78-33991
N78-33992
BECKER, M. N78-33915
BECKER, R. H. N78-34013
BECKMANN, R. C. N78-33083
BEDNARCZYK, S. N78-34022
BEEKMAN, S. W. N78-33101
BEELAND, G. V. N78-33672
BEHL, W., K. N78-33167
BEIDEMAN, F. E., JR. N78-33162
BELL, A. T. N78-33258
BELL, D. E. N78-33514
BELLEW, W. F. N78-33661
BENEFE, D. B. N78-33113
N78-33114
N78-33115
N78-33116
N78-33117
N78-33118
BENNER, R. E. N78-33955
BENNETT, C. O. N78-33175
BENSON, D. C. N78-33581
BEREANO, P. L. N78-33319
BERGER, R. B. N78-33092
BERNARD, B. B. N78-33614
BESHORE, D. G. N78-33537
BHAT, S. P. N78-33190
BHATTACHARYYA, S. N78-33245
BIEHL, B. L. N78-33808
BIEN, F. N78-33347
BIERMAN, G. J. N78-33789
BILLEN, J. H. N78-33906
BILLET, M. L. N78-33388
BILLHARDT, C. F. N78-33200
N78-33201
BLACKSTONE, E. A. N78-33319
BLAHA, M. N78-33907
BLANCHARD, M. B. N78-34014
N78-34021
BLAUVELT, A. A. N78-33125
BLODGET, H. W. N78-33499
BLYTH, L. A. N78-33970
BOEER, K. W. N78-33169
BOGDONOFF, S. M. N78-33056
BOGHANI, A. B. N78-33792
N78-33793
BOLDT, E. A. N78-34013
BOLEY, D. N78-33754
BONEWITZ, R. A. N78-33211
BONEY, L. R. N78-33135
BOODY, F. P. N78-33434
N78-33435
BORDEN, P. G. N78-33327
BOSTIAN, C. W. N78-33287
N78-33288
BOWERS, G. L. N78-33452
BOWERS, J. L. N78-33139
BOWERS, R. N78-33319
BOWMAN, M. G. N78-33586
BOYDEN, R. P. N78-33050
BRACKEN, T. D. N78-33722
BRADLEY, D. J. N78-33206
BRAMSON, A. N78-33747
BRANDT, W. E., JR. N78-33742
BRANNAN, J. R. N78-33135
BRASWELL, T. V. N78-33266
BRAUDAWAY, D. W. N78-33556
BRAUER, H. J. N78-33386
BRENCHLEY, D. L. N78-33565
BREWER, R. N78-33621
BREWER, T. L. N78-33343
BRICE, C. W. N78-33351
BRIEHL, D. N78-33618
BRILEY, W. R. N78-33044
BRIX, V. L. N78-33565
BROCK, J. S. N78-33413
BROCKWAY, M. C. N78-33535
BROWN, C. M., JR. N78-33055
BROWN, G. A. N78-33343
BROWN, J. S. N78-33224
BROWN, M. L. N78-33565
BROWN, N. J. N78-33181
BROWN, S. D. N78-33469
BROWN, S. R. N78-33197
BROWNE, J. C. N78-33786
BROWNLEE, D. E. N78-34021
BRUCE, C. N78-33621
BRUCE, T. W. N78-33104
BRUSSAT, T. R. N78-33483
BRYAN, R. H. N78-33208
BRYANT, J. C. N78-33780
BUCHINSKI, E. J. N78-33983
BUCKLAND, G. H. N78-33739
BUCKLEY, J. L. N78-33631
BUCKNER, A. T. N78-33242
BULLARD, D. L. N78-33139
BUNCH, T. E. N78-34021
BUNT[illegible] A. R. N78-33535
BURIC, M. R. N78-33828
BURKE, W. J. N78-33933
BURKHARD, N. N78-33666
BURKHARDT, J. H., JR. N78-33452
BURLESON, R. R. N78-33453
BURNSIDE, W. D. N78-33311
BUTNER, D. N. N78-33799
BUTTINGER, J. D. N78-33098
BUZBEE, B. L., S.V. N78-33754
BUZO, A. N78-33316

C

CADY, W. E. N78-33242
N78-33244
CAIN, O. J. N78-33952
CALAFELL, D. O., II N78-33482
CALDER, C. A. N78-33212
CALVERT, S. N78-33637
CAMERON, M. W. N78-33733
CANAVAN, G. H. N78-33557
CANTOR, C. J. N78-33661
CAPON, A. S. N78-33722
CAPTAIN, K. M. N78-33792
CARLSON, A. N78-33542
CARLSON, G. G. N78-33504
CARLSON, H. W. N78-33051
CARLSON, L. W. N78-33889
CARLSON, R. T. N78-33909
CARMICHAEL, D. C. N78-33535
CARMICHAEL, J. P. N78-33862
N78-33863
CARRIERO, N. J. N78-33733
CARY, P. G. N78-33182
CASARINI, J. R. N78-33146
CASE, G. R. N78-33816
CASEY, D. H. N78-33292
CASEY, R. F. N78-34010
CATALANO, S. B. N78-33448
CATASSO, F. A. N78-33940
CAVAGNARO, D. M. N78-33185
N78-33246
N78-33247
N78-33262
N78-33263
N78-33275
CAWTHORN, J. M. N78-33874
CHAMBERLAIN, T. W. N78-33455
N78-33456
N78-33457
CHAMIS, C. C. N78-33149

CHAN, K. H. N78-33328
CHAN, W. S. N78-33807
CHANDLER, R. F. N78-33737
CHANDRA, M. N78-33466
CHANEY, L. N78-33429
CHANG, A. T. C. N78-33284
N78-33512
CHANG, D. C. N78-33308
N78-33346
CHANG, H. N78-33184
CHANG, J. N78-33684
CHANG, J. F. J. N78-33329
CHANG, N. J. F. N78-33659
CHANG, S. J. N78-33496
CHEN, C. C. N78-33373
CHEN, C. L. N78-33310
CHEN, C. Y. N78-33204
CHEN, T. H. N78-33255
CHEN, T. P. N78-33966
CHERKASOV, I. S. N78-33729
CHERUBINI, G. N78-33666
CHIANG, A. M. N78-33406
CHIN, B. L. N78-33582
CHIU, S. T. N78-33483
CHO, C. N78-33368
CHODROW, M. N78-33348
CHOI, W. K. N78-33279
CHOU, B. E. N78-33180
CHOUDHURY, B. J. N78-33284
CHRISTOFFERSSON, A. N78-33658
CHU, S. C. N78-33337
CHU, Y. E. N78-33705
CIPRIOS, G. N78-33577
CLAUSS, J. S., JR. N78-33086
COCHRAN, K. E. N78-33565
COE, D. S. N78-33037
COE, P. L., JR. N78-33047
COHEN, D. B. N78-33547
COHEN, J. B. N78-33486
COHEN, P. I. N78-33202
N78-33203
COHEN, S. C. N78-33647
COHN, S. N78-33570
COKER, F. N78-33977
COLE, R. J. N78-33565
COLEMAN, J. R. N78-33704
COLLETT, E. N78-33431
COMEAU, C. M. N78-34009
COMFORT, D. L. N78-33785
CONE, B. W. N78-33565
COOK, G. R. N78-33647
COOK, K. V. N78-33880
COPE, J. N78-33570
CORDRAY, R. L. N78-33423
CORK, T. R. N78-33097
CORNELL, C. O. N78-33732
CORSIGLIA, V. R. N78-33043
COSTLEY, W. J. N78-33985
COX, K. E. N78-33559
N78-33586
CRAIG, J. D. N78-33733
CRAMPTON, S. B. N78-33425
CRANE, R. K. N78-33680
CREAGER, M. N78-33483
N78-33484
CROISANT, W. J. N78-33312
CRONRATH, D. N78-33277
CROOKS, S. N78-33991
N78-33992
CROOKS, W. H. N78-33797
CROW, E. L. N78-33995
CRUMMETT, W. P. N78-33967
CUELLAR, J. P., JR. N78-33237
CULOTTA, R. F. N78-33123
CUMMINGS, G. D. N78-33714
CUMMINGS, G. E. N78-33493
CUMMINGS, J. J. N78-33552
CUNNAN, W. S. N78-33109
CUNNINGHAM, A. M., JR. N78-33113
N78-33114
N78-33115
N78-33116
N78-33117
N78-33118
CURREN, A. N. N78-33137
CURRY, M. G. N78 33565
CURRY, W. H. N78-33121
CUSTIS, I. H. N78-33619

D

DALLEK, S. N78-33544
DARLAND, E. J. N78-33412
DAUGHNEY, C. C. N78-33945
DAVENPORT, C. M. N78-33452
DAVIDSON, D. L. N78-33487
DAVIDSON, R. N78-33565
DAVIES, T. J. N78-33415
DAVIS, E. L. N78-33817
DAVIS, F. G. N78-33104
DAVIS, J. N78-33907
DAVIS, P. A. N78-33686
DAVIS, R. B. N78 33252
N78-33253
DAWSON, B. A. N78-33867
DAY, G. W. N78-33438
DAY, J. R. N78-33437
DECARVALHO, V. C. N78-33507
DEFREES, R. E. N78-33127
DEJESUSPARADA, N. N78-33507
DEJOY, D. M. N78-33612
DELOACH, R. N78-33874
DELUCCIA, J. J. N78-33197
DEMANSS, J. L. N78-33733
DENAVIT, J. N78-33302
DEPUE, A. K. N78-33838
DERWA, G. T. N78-33779
DEVAN, J. H. N78-33215
DEVERALL, J. E. N78-33392
DEWITT, J. N78-33323
DEY, A. N. N78-33543
DIEHL, L. A. N78-33102
DIETENBERGER, M. N78-33662
DIETZ, C. G. N78-33449
DILLARD, B. M. N78-33176
DINER, D. B. N78-33711
DINGER, R. J. N78-33293
DINGLE, A. N. N78-33676
DIPPOLITO, R. S. N78-33766
DOBRAN, F. N78-33367
DODD, B. N78-34006
DOMAS, P. A. N78-33101
DOOLEY, D. M. N78-33522
DOOLITTLE, R. N78-33416
DOSS, S. K. N78-33826
DOSSANTOS, J. R. N78-33507
DOWDY, L. W. N78-33809
DOWDY, M. W. N78-34007
DOWNING, J. P. N78-33905
DOWSON, D. N78-33447
DOYLE, F. J. N78-33581
DRAPER, B. L. N78-33414
DRYER, F. L. N78-33177
DUANE, J. N78-33622
DUBI, A. N78-33900
DUFF, B. M. N78-33307
DUNFORD, R. W. N78-33887
DUNHAM, J. G. N78-33767
DUNKER, C. N78-33133
DUNLAP, H. L. N78-33968
DUNLOP, J. N78-33991
N78-33992
DUNMYER, W. D. N78-33113
N78-33114
N78-33115
N78-33116
N78-33117
N78-33118
N78-33085
N78-33364
N78-33943
N78-33660
N78-33213
N78-33184
N78-33344
N78-33390
N78-33345
N78-33638
DUNN, F. K.
DUNN, J. E., III
DUNN, P. F.
DUNTLEY, S. Q.
DUQUETTE, D. J.
DURBETAKI, P.
DURSCHINGER, J. A.
DUTTON, J. C.
DUTTON, R. W.
DYKEMA, O. W.

E

EASTERLING, J. N78-33565
EASTERLING, L. R. N78-33111
EASTMAN, C. M. N78-33777
EATON, R., III N78-33350
EDMONDSON, S. N78-33319
EDWARDS, D. K. N78-33379
EDWARDS, T. J. N78-33157
EGAN, D. E. N78-33099
EGYHAZY, C. J. N78-33998
EINBINDER, L. W. N78-33655
EINSTEIN, T. L. N78-33203
EIS, K. E. N78-33411
ELACHI, C. N78-34022
ELAM, J. N78-33869
ELAM, W. T. N78-33202
N78-33203
ELDER, A. S. N78-33838
ELLIOT, L. N78-33786
ELLIS, B. G. N78-33633
ELROD, D. C. N78-33393
ELZINGA, M. B. N78-33470
EMAMI, G. N78-33833
ENGEN, I. A. N78-33567
ENGLER, N. A. N78-33662
ENGSTROM, S. D. N78-33705
ENKE, C. G. N78-33171
ERHARDT, K. N78-33915
ERICKSON, A. E. N78-33633
ERIKSON, W. J. N78-33785
ERNST, D. W. N78-33544
ERNST, M. N78-33991
N78-33992
ESCHBACH, J. E. N78 33595
ETZEL, M. H. N78-33303
EVANS, D. L. N78-33645
EWANIZKY, T. F. N78-33430
N78-33432
EYLER, T. R. N78-33722

F

FABRIS, G. N78-33943
FAIRCHILD, R. C. N78-33470
FASSBENDER, A. G. N78-33565
FAULKNER, W. H. N78-33736
FEDDES, R. G. N78-33683
FEINBERG, J. N78-33925
FELDMAN, N. N78-33300
FENG, D. N78-33756
FENTON, D. L. N78-33106
FENVES, S. J. N78-33777
FERNANDES, S. T. N78-33048
FEY, W. A. N78-33136
FICKETT, F. R. N78-33225
FIELD, E. C., JR. N78-33295
N78-33665
FILLIBE, J. J. N78-33629
FINLEY, T. D. N78-33874
FISCHHOFF, B. N78-33837
FISH, R. B. N78-33792
N78-33793
FISHBURN, J. S. N78-33815
FISHER, W. B. N78-33758
FITE, J., JR. N78-33733
FITTIPALDI, J. J. N78-33620
FITZGERALD, J. W. N78-33416
FITZPATRICK, M. U. N78-33744
FLEMING, R. D. N78-33261
FLEMING, W. H. N78-33860
FLOWERS, W. N78-33429
FOGELSON, S. N78-33542
FOLEY, J. T. N78-33959
FORESTER, J. P. N78-33958
FOWLER, B. W. N78-33305
FOX, S. N78-33773
FRANCOIS, R. E., JR. N78-33910
FRASER, C. W. N78-33790
FRAZER, R. E. N78-33715
FREDERICK, J. R. N78-33470
FREEDMAN, J. E. N78-33313
FREEDMAN, R. W. N78-33628
FREEDY, A. N78-33797
FREEMAN, D. N78-33492
FREY, J. N78-33319
FRIZEN, D. J. N78-33276
FROME, E. N78-33796
FUJIOKA, T. N78-33871
FUKUDA, Y. N78-33203
FULLER, D. N78-33542
FUNG, S. C. N78-33577

G

GABRIEL, A. N78-34022
GAINES, G. B. N78-33535
GALLAGHER, A. C. N78-33427
GAMMELL, P. M. N78-33716
GARCIA-GARDEA, E. N78-33443
GARCIA, R. N78-33481
GARFINKEL, M. N78-33265
GARNIS, E. A. N78-33235
GARRISON, P. E. N78-33306
GARTLING, D. K. N78-33395
GARTNER, E. M. N78-33537
GATOS, H. C. N78-33195
GELPEY, J. C. N78-33406
GEORGE, M. N78-33540
GEORGE, S. M. N78-33174
GERHART, G. N78-33410
GERVAIS, R. L. N78-33571
GEYSER, L. C. N78-33110
GIBBONS, J. F. N78-33345
GILENKO, A. V. N78-33729
GILFORD, M. N78-33255
GILL, W. N78-33394
GILLESPIE, L. K. N78-33397
GILLOGLY, J. J. N78-33868
GIROUX, M. S. N78-33705
GIULIANO, V. N78-33991
N78-33992
GLOSS, B. B. N78-33045
GLOVER, F. N78-33869
GOLD, C. H. N78-34006
GOLD, D. P. N78-33505
GOLDSTEIN, J. N78-33293
GOLDSTEIN, S. A. N78-33908
GOLIS, M. J. N78-33469
GOLOB, J. E. N78-33415
GOMBERG, R. I. N78-33135
GOODSON, J. E. N78-33099
GOOL, W. N78-33550
GORDON, J. I. N78-33660
GORSKI, A. J. N78-33585
GOULD, R. K. N78-33398
GRAHAM, R. A. N78-33494
GRAMATI, S. D. E. N78-33204
GRAVEN, R. M. N78-33585
GRAVES, R. S. N78-33219
GRAVES, S. C. N78-33864
GRAY, K. E. N78-33359

GRAY, R. M. N78-33316
GREENE, L. M. N78-33452
GREENLEE, T. R. N78-33890
GREENWOOD, R. C. N78-33655
GREGORY, W. S. N78-33394
GRIFFITH, D. A. N78-33677
GRIFFITH, R. W. N78-33584
GROBMAN, J. N78-33102
GROOMS, D. W. N78-33763
GROSE, J. H. N78-33999
GROSSKREUTZ, J. C. N78-33587
GROSSMAN, L. W. N78-33895
GROVER, M. K. N78-33515
GRUBER, A. N78-33301
GUINN, J. A., JR. N78-33917
GUNTHER, F. J. N78-33499
GUPTA, S. D. N78-33870
GUREWITZ, P. H. N78-33400
GURGANUS, E. A. N78-33616
GUSTINCIC, J. J. N78-33405
GUY, A. W. N78-33720
GWALTNEY, R. C. N78-33490

H

HABERCOM, G. E., JR. N78-33066
N78-33122
N78-33278
N78-33402
N78-33403
N78-33404
N78-33498
N78-33639
N78-33694
HADDICK, G. T. N78-33223
HAGAN, M. P. N78-33661
HAGENSON, R. L. N78-33926
HAGEY, G. N78-33554
N78-33579
N78-33622
HAINES, A. L. N78-33068
HALEY, F. C. N78-33913
HALL, R. A. N78-34007
HALL, R. N. N78-33265
HALLE, J. C. N78-33894
HALLET, R. W., JR. N78-33571
HALLETT, J. N78-33684
HALLGREN, R. E. N78-33689
HALLIDAY, R. A. N78-33508
HALLOW, W. C. N78-33619
HAMMING, R. W. N78-33098
HAMROCK, B. J. N78-33447
HANSELMAN, J. C. N78-33077
N78-33078
N78-33079
N78-33080
HANSEN, F. V. N78-33682
HANSEN, P. N78-33663
HANSLOWE, K. L. N78-33319
HARDY, S. R. N78-33132
HARKNESS, J. D. N78-33539
HAROWITZ, Y. S. N78-33900
HARRINGTON, R. F. N78-33315
HARRIS, E. G. N78-33942
HARRIS, P. J. N78-33168
HARRISON, E. A. N78-33724
HART-SMITH, L. J. N78-33449
HARTMAN, C. D. N78-33566
HARTQUIST, E. E. N78-33758
N78-33760
HARVEY, R. R. N78-33409
HASHEMI-MONAVAR, K. N78-33893
HATHAWAY, R. E. N78-33575
HAUGHT, A. F. N78-33946
HAYS, A. P. N78-33086
HEARN, D. W. N78-34011
HEDRICK, C. L. N78-33942
HEINE, W. N78-33074
N78-33075
N78-33076
HENDEL, F. J. N78-33228
HENRY, D. G. N78-33349
HEPPNER, J. P. N78-33339
HERAKOVICH, C. T. N78-33153
HERGET, W. F. N78-33105
HERNANDEZ, J. D. N78-33194
HERSHEY, C. N78-33319
HEYSER, R. C. N78-33716
HIBBARD, P. G. N78-33795
HIEBERT, K. J. N78-33832
HIEFTJE, G. M. N78-33932
HILEMAN, F. D. N78-33163
HILTON, B. D. N78-33155
HIMMELL, L. C. N78-33936
HINDS, W. T. N78-33720
HINMAN, G. N78-33558
HINTON, D. A. N78-33731
HIRATA, G. A. N78-33691
HJERESEN, D. L. N78-33720
HOBBS, R. H. N78-33428
HOCK, J. N78-33622
HODGE, P. W. N78-34021
HOELTGEN, K. N78-33522
HOLDEN, J. R. N78-33433
HOLLIDAY, B. G. N78-33874
HOLMES, H. K. N78-33874
HOLT, L. N78-33579
HOLT, S. S. N78-34013
HONEYCUTT, G. N78-33096
HONG, S. N78-33204
HOORFAR, A. N78-33346
HORAK, H. L. N78-33394
HOROWITZ, S. M. N78-33062
HORST, T. W. N78-33674
HOSTETLER, L. D. N78-33083
HOWARD, F. G. N78-33385
HOWES, M. A. H. N78-33245
HOYT, R. C. N78-33951
HSIAO, D. K. N78-33753
HSIEH, P. I. P. N78-33852
HSU, G. C. N78-33164
HSU, W. H. E. N78-33145
HUANG, N. E. N78-33696
HUDSON, F. P. N78-33656
HUH, M. Y. N78-33853
HUNDEMANN, A. S. N78-33523
N78-33599
N78-33600
N78-33601
N78-33602
N78-33608
N78-33609
N78-33610
N78-33700
N78-33561
N78-33970
N78-33740
N78-34024
N78-33768
N78-33814
HUNKE, R. W. N78-33595
HUNT, B. D. N78-33722
HUNTER, E. D. N78-33374
HUNTER, H. C. N78-33189
HWANG, T. Y. N78-33215
HYNES, J. F. N78-33739
N78-33301
N78-33475
N78-33043

I

IANNUCILLI, M. N78-33039
IHLE, G. M. N78-33510
IKOKU, C. U. N78-33928
IMAN, M. A. N78-33547
INOUYE, H. N78-33666
IRISH, P. A., III N78-33570
IRVINE, J. N78-33872
ISHIHARA, T. N78-33537
IVERSEN, J. D. N78-33825
N78-33131
N78-33486
N78-33574
N78-33787
N78-33782
N78-33357
N78-33899
N78-33180
N78-33060
N78-33976
N78-33451
N78-33829
N78-33214
N78-33717
N78-33195
N78-33977
N78-33660
N78-33778
N78-33570
N78-33040
N78-33098
N78-33574
N78-33579
N78-33102
N78-33182
N78-33782
N78-33630
N78-33772
N78-33334
N78-34023
N78-33041
N78-33720

J

JACHNA, S. N78-33055
JACK, J. R. N78-33960
JACKEL, S. M. N78-34032
JACKSON, B. L. N78-33751
JACKSON, D. D. N78-33753
JACKSON, J. R. N78-33876
JACYNA, G. M.
JAEGER, F. A.
JAMES, H. M. H.
JAMES, J. H.
JAMES, M. R.
JARDINE, D. M.
JEFFERSON, D. K.
JENNE, R. L.
JENNINGS, C. W.
JENSEN, C. C.
JEPPSON, D. W.
JOBE, C. E.
JOGLEKAR, P. N. Y.
JOHANNES, J. D.
JOHNSON, C. D.
JOHNSON, D. L.
JOHNSON, J. E.
JOHNSON, K. H.
JOHNSON, L.
JOHNSON, R. W.
JOHNSON, T. G.
JOHNSON, W. S.
JOHNSTON, W. A.
JONES, C. R.
JONES, D. W.
JONES, F. C.
JONES, R.
JONES, R. E.
JORDAN, R.
JOSEPH, D. H.
JOSEPH, D. W.
JOTWANI, N. D.
JU, K.
JUDGE, D. L.
JUILLEN, J. C.
JUSTESEN, D. R.

K

KAIN, J. E.
KALISVAART, M.
KAMIN, A.
KAMINSKY, W. J., JR.
KANNAN, K.
KARAMCHETI, K.
KARANAM, V. R.
KARGMAN, H.
KARKALIK, F. G.
KASEMIR, H. W.
KATTAWAR, G. W.
KATZ, R.
KAU, S. P.
KAULA, W. M.
KAYSER, L. D.
KAZANJIAN, A. R.
KEDDY, E. S.
KEEFFE, B. E.
KELLER, O. L., JR.
KEMME, J. E.
KEMP, V. E.
KENNEDY, B. W.
KENTON, E.
KENTON, J.
KERR, D. H.
KESSLER, E.
KETOKHOV, V.
KHUNGAR, S. L.
KHVALOVSKIY, V. V.
KIENAPPEL, K.
KIM, Y. K.
KIMBALL, K. A.
KIMBLE, H. J.
KING, D. W.
KING, J. N.
KING, R. C.
KINZLY, R. E.
KIRCOS, L. T.
KLEIMAN, H.
KLEIMAN, L.
KLICK, D. I.
KLINGMAN, D.
KLUFAN, R. M.
KNOX, J. B.
KNUEVEN, P. J.
KOCH, M. E.
KODRES, U. R.
KOEHLER, D. E.
KOENIG, K.
KOENKE, E. J.
KOHN, E. S.
KOHN, S. E.
KOLOSOV, M. A.
KOLSTAD, C.
KONRAD, M. D.
KOO, C. H.
KORJACK, T. A.
KOSONOCKY, W. F.
KOUTRAS, D. C.
KOUYOUMJIAN, J. A.
KOZELSKY, J. K.
KOZLOV, V. V.
KRAHR, W.
KREID, D. K.
KREITNER, J. D.
KRENZER, R. W.
KRESOVICH, S.
KREZANOSKY, L. T.
KRIEG, R. D.
KU, R. T. M.
KUCZYNSKI, G. C.
KUDRYAVTSEV, V. A.
KUESTER, E. F.
KUESTER, J. L.
KUHN, H. W.
KUHN, S.
KUHN, T. E.
KUNII, H. S.
KUONG, C.
KUPPIN, M. A.
KURCHATOV, I. B.
KUSHNIR, J. M.
KYTE, F. T.

L

LAMBRECH, M. N78-33541
LANDE, J. N78-33320
N78-33321
LANDRY, M. J. N78-33417
N78-33973
LANGE, F. F. N78-33231
N78-33232
N78-33233
N78-33234
LANGE, W. G. N78-33408

LANGLEY, R. A. N78-33973
LARK, R. F. N78-33150
LARRICK, B. F. N78-33544
LAU, K. M. W. N78-33675
LAUMAN, E. A. N78-33526
LAUZZANA, R. N78-33663
LAWANDY, N. M. N78-33424
LAWHON, W. T. N78-33259
LEBOEUF, J. N. N78-33934
LECROISSETTE, D. H. N78-33716
LEE, A. M. N78-33319
LEE, C. C. N78-33351
LEE, C. F. N78-33172
LEE, D. W. N78-33350
LEE, H. J. N78-33619
LEE, J. G. N78-33055
LEE, J. M., JR. N78-33722
LEE, R. N78-33908
LEE, S. T. N78-33158
LEE, Y. H. N78-33160
LEE, Y. T. N78-33057
LEES, M. A. N78-33738
LEHMAN, H. N78-33576
LEIBOVITZ, J. N78-33159
LEITAO, C. D. N78-33696
LEMNIOS, A. Z. N78-33085
LEONARD, E. M. N78-33625
LEROI, G. E. N78-33412
LERUP, L. N78-33277
LEVERETT, B. W. N78-33795
LEVINE, R. D. N78-33899
LEVITA, G. N78-33280
LEWINSTEIN, M. N78-33665
LEWIS, D. K. N78-33880
LEWIS, G. W., JR. N78-33107
LEWIS, J. G. N78-33515
LEWIS, R. B. N78-33874
LI, C. Y. N78-33370
LICHTENSTEIN, S. N78-33837
LIMSUWAN, P. N78-33969
LIN, F. S. N78-33191
LIN, Y. H. N78-33389
LINDNER, F. N78-33096
LINDOW, B. G. N78-33283
LINDSTED, R. D. N78-33371
LIOU, K. N. N78-33683
LIPINSKY, E. S. N78-33259
LIU, C. S. N78-33941
LIU, J. K. C. N78-33277
LLOYD, J. M., JR. N78-33325
LO, S. K. T. N78-33227
LOBANOV, N. N78-33140
LONG, T. T. N78-33970
LOONEY, L. D. N78-33415
LOPATKA, R. S. N78-33778
LORENZ, J. J. N78-33399
LOVELACE, J. S. N78-33998
LOVELL, W. A. N78-33087
LUCAS, B. D. N78-33762
LUCIER, E. N78-33072
LUDWIG, F. L. N78-33671
LUEDKE, E. E. N78-33379
LUND, K. O. N78-33372
LUNDGREEN, R. B. N78-33142
LUSH, A. M. N78-33454
LUU, T. K. N78-33911
LUZWICK, J. N78-33315
LYNCH, E. P. N78-33588
LYNCH, J. W. N78-33874
LYONS, P. B. N78-33415

M

M-TEHRANI, M. N78-33421
MABRY, J. E. N78-33615
MACCRACKEN, M. C. N78-33626
MACDONALD, H. N78-33644
MACIOLEK, R. B. N78-33406
MACK, E. A. N78-33290
MACK, R. J. N78-33051
MACLAREN, R. O. N78-33250
MADALA, R. V. N78-33835
MADARASZ, F. L., III N78-33949
MAGNUSON, R. A. N78-33979
N78-33980
MAINE, R. E. N78-33054
MAJUMDAR, S. N78-33217
MAKUCH, R. W. N78-33854
MALIA, J. F. N78-33100
MALIK, R. A. N78-33067
MALLNER, C. N78-33542
MANTEUFFEL, T. A. N78-33841
MANUS, E. A. N78-33287
MARCH, E. J. N78-33927
MARCHETTI, P. N78-33541
MARCINIEC, J. W. N78-33406
MARIN, S. P. N78-33823
MARONI, V. A. N78-33940
MARSHAL, J. N78-33595
MARSHALL, D. E. N78-33406
MARSHALL, R. N78-34006
MARSHALL, R. E. N78-33287
MARSHALL, W. F. N78-33455
N78-33456
MARSTON, T.
MARTIN, W. C.
MASSENA, W. A.
MASSOGLIA, M. F.
MATEY, J. R.
MATHEWS, F. S.
MATSUYAMA, Y.
MATTHEWS, R. D.
MATTOX, D. M.
MATTSON, R.
MAXFIELD, D.
MAYES, W. H.
MAYNARD, N. C.
MAYO, G.
MAZUR, J. T.
MCBRAYER, J. D.
MCCABE, E. F., JR.
MCCALLUM, S. H.
MCCARRON, R. L.
MCCARTHY, A. E.
MCCARTHY, J. F., JR.
MCCATHERN, D. A., JR.
MCCLURE, T. A.
MCCONKEY, E. D.
MCCURDY, D. A.
MCDONALD, H.
MCELROY, J. H.
MCGILL, R. A.
MCGILVERY, D. C.
MCGOLDRICK, P. R.
MCGUIRE, D. C.
MCINTIRE, W. R.
MCINTYRE, F. L.
MCKINNON, M. A.
MCKNIGHT, S. W.
MCNAMARA, R. P.
MCRYER, D. T.
MEHLHORN, T. A.
MEHRABIAN, R.
MEINDL, J. D.
MENDELSSOHN, R. C.
MENDENHALL, J. R.
MENDILLO, M.
MERAT, F. L.
MERCADO, N.
MEREDITH, R.
MERSTEN, G. S.
MERTIE, J. B., JR.
METCALF, J. I.
MEYBURG, A.
MEYER, C. H., JR.
MEYER, M. E.
MICHALKO, I.
MICHEL, R.
MICHELS, H. H.
MIDDLEKAM, L. C.
MIGIAWALA, K. R.
MIKHAILOVSKII, A. B.
MIKULAS, M. M., JR.
MILANOVSKIY, Y. Y.
MILBURN, D. A.
MILEY, G. H.
MILGRAM, D. L.
MILLER, F. M.
MITCHELL, H. G., JR.
MITCHELL, R. A.
MITSUI, A.
MITTRA, R.
MOHAMED, H. A.
MONGIA, H. C.
MONTENEGRO, J. L. D. A.
MONTUORI, A.
MOORE, A. M.
MOORE, J. P.
MOORE, R. D.
MOORE, T. C.
MOORHEAD, P. E.
MOOTE, R. W.
MORALES, G. J.
MORAN, B.
MOREN, A. E.
MORENO, S. C.
MORETTI, G.
MORIN, S.
MORINO, L.
MORRIS, G.
MORRISON, J. D.
MORTENSEN, W. E.
MORTON, T. P.
MOSES, D.
MOSS, A. R.
MOSS, M. S. N78-33690
MOYZIS, J. A. N78-33468
MRAVLAG, E. N78-33931
MUDGE, T. N. N78-33794
MUELLER, D. E. N78-33855
MUIRHEAD, V. U. N78-33444
MULCAHY, J. F. N78-33097
MUNDIE, L. N78-33300
MURPHY, H. N78-33572
MURPHY, J. A. N78-33771
MURTHY, S. N. N78-33834
MURTY, Y. V. N78-33204
MUSCIANESI, P. N78-33301

N

NACHMIAS, S. N78-33112
NAGALINGAM, S. J. S. N78-33434
N78-33435
NAGLE, R. E. N78-33755
NAGPAL, V. N78-33200
N78-33201
NAGY, S. F. N78-33270
N78-33271
N78-33272
N78-33273
NAHM, A. H. N78-33463
NAKAMURA, A. I. N78-33409
NAKLES, D. V. N78-33525
NALIVAYKO, V. I. N78-34029
NANCE, G. P. N78-33535
NATAROVSKIY, S. N. N78-34029
NATION, J. A. N78-33896
N78-33897
NDUBIZU, C. C. N78-33184
NEAD, M. W. N78-33789
NEDZVETSKIY, V. A. N78-33729
NEHRIR, M. H. N78-33330
NELSON, B. W. N78-34003
NELSON, D. B. N78-33938
NELSON, M. A. N78-33415
NESTERCZUK, G. N78-33654
NETI, S. N78-33377
NEWMAN, K. L. N78-33562
NEWTON, R. W. N78-33284
NICHOLSON, D. R. N78-33941
NICKERSON, G. R. N78-33142
NIELSON, P. N78-33312
NITTA, D. H. N78-33138
NITZ, D. E. N78-33888
NIZNIK, C. A. N78-33811
NOEL, G. T. N78-33535
NOGGLE, L. W. N78-33060
NORDSTROM, T. V. N78-33355
NORRIS, D. M., JR. N78-33491
NOVAK, E. W. N78-33620
NYBORG, W. L. N78-33725

O

OBERSTE-LEHN, D. N78-33515
OBRIEN, C. J. N78-33142
OHLHORST, C. W. N78-33617
OLSEN, R. O. N78-33657
OLSON, R. C. N78-33818
ONEAL, J. B., JR. N78-33304
ONEIL, R. W. N78-33426
ONSTOTT, E. D. N78-33736
ORLIK-RUECKEMANN, K. J. N78-33121
ORLOFF, K. L. N78-33043
ORMSBEE, A. I. N78-33048
ORPHAN, R. C. N78-33624
OSADA, H. N78-33419
OSBORN, W. M. N78-33107
OSHRIN, S. E. N78-33709
OSKAM, B. N78-33056
OTT, W. R. N78-33635
OTTINGER, P. F. N78-33923
OVERSTREET, W. P. N78-33287
N78-33288

P

PAHNICHAPUTT, W. N78-33442
PAKKANEN, M. A. N78-34030
PALMER, D. W. N78-33414
PALMER, R. N78-33558
PAN, Y. C. N78-33577
PANNELL, R. B. N78-33161
PARK, K. N78-33420
PARK, R. L. N78-33202
N78-33203
PARKER, E. R. N78-33223
PARKER, W. B. N78-33522
PARRA, C. G. N78-33696
PARROTT, T. L. N78-33875
PARZEN, E. N78-33836
N78-33861
N78-33862
PATEL, D. N78-33541
PATEL, V. C. N78-33057
PAUL, J. H. N78-33856

PEEPLES, J. W. N78-33336
PEIRCE, H. B. N78-33757
PELTON, E. L. N78-33311
PENDLEY, R. N78-33558
PENNY, M. M. N78-33134
PERKINS, P. J. N78-33618
PERRY, D. E. N78-33722
PERSINGER, R. R. N78-33287
PETERS, D. A. N78-33289
PETERS, R. A. N78-33125
PETERS, W. H., III N78-33471
PETERSEN, W. B. N78-33627
PETERSON, B. N78-33338
PETERSON, T. M. N78-33582
PETIT, G. S. N78-33220
PETRASH, D. A. N78-33102
PHELPS, A. V. N78-33427
PHILLIPS, J. R. N78-33396
PHILLIPS, K. J. N78-34005
PHOEBE, C. H. N78-33592
PIERSON, E. S. N78-33943
PIROGOV, N. I. N78-33729
PITEL, I. J. N78-33335
PLASS, G. N. N78-33917
PLATE, S. W. N78-33308
PLUMMER, J. D. N78-33345
PODWYSOCKI, M. H. N78-33499
POLAK, A. J. N78-33165
POP, H. G. N78-33478
POPE, R. E. N78-33081
N78-33082
POPPER, G. F. N78-33416
POSEY, D. L. N78-33123
POST, R. F. N78-33944
POTTS, M. J. N78-33519
POWELL, C. A. N78-33873
POWELL, C. A., JR. N78-33613
POWELL, J. D. N78-33287
PRASAD, A. N78-33084
PRATER, J. T. N78-33957
PRAVDO, S. H. N78-34013
PREISENDORFER, R. W. N78-33681
PRELAS, M. A. N78-33434
N78-33435
PRICE, C. N78-33781
PRICE, J. E. N78-33087
PRICE, K. E. N78-33746
PRICE, P. B. N78-34025
PRICE, T. W. N78-34007
PRICE, V. N78-33517
PROSKUROWSKI, W. N78-33798
PUCINO, A. T. N78-33972
PUSHCHAROVSKIY, Y. M. N78-33643

Q

QUARTERO, C. B. N78-33087
QUERRY, M. R. N78-33182
QUIGLEY, E. F. N78-33485
QUINONES, D. F. N78-33491

R

RACE, K. R. N78-33089
RAGAN, H. A. N78-33720
RAMAIAH, M. N78-33472
RAMANATHAN, G. V. N78-34018
RAMILLER, C. L. N78-33968
RANEY, J. M. N78-33468
RANGHELLI, J. N78-33301
RANSONE, P. O. N78-33230
RANTA, A. N78-33285
N78-33648
N78-33650
RANTA, H. N78-33285
N78-33650
RAO, G. V. N78-33687
RAPTIS, A. C. N78-33416
RAWSON, G. E. N78-33515
RAYMOND, J. P. N78-33342
RAYMOND, W. H. N78-33687
REED, R. P. N78-33225
REED, W. E. N78-33322
N78-33361
N78-33362
N78-33363
N78-33460
N78-33461
N78-33462
N78-33885
N78-33886
REICHERT, J. D. N78-33413
REID, L. N78-33108
REIMHERR, G. W. N78-33764
N78-33765
N78-33806
REIMNITZ, P. N78-33857
REIS, V. H. N78-33557
REQUICHA, A. A. G. N78-33758
N78-33842
N78-33844
REUTER, R. C., JR. N78-33596
REYER, R. N78-33542
REYNOLDS, R. K. N78-33526
RHODES, M. D. N78-33152
RICHARDSON, J. H. N78-33174
RICHARDSON, M. N78-33490
RICHMOND, O. N78-33236
RICHTER, E. S. N78-33653
RICKARD, R. C. N78-33411
RICKETTS, C. I. N78-33394
RIEKE, K. L. N78-33243
RIESENFELD, R. F. N78-33756
RIGGINS, R. E. N78-33620
RIZZETTA, D. P. N78-33058
ROBINSON-SABA, J. N78-34013
ROBINSON, W. E. N78-33552
ROCHEFORT, J. S. N78-33141
RODER, F. L. N78-33904
RODERER, N. K. N78-33987
N78-33988
N78-33989
N78-33990
ROEFS, H. F. A. N78-33297
ROELOFS, L. N78-33202
ROGERS, D. G. N78-33183
ROGERS, J. L., JR. N78-33791
ROGERS, L. E. N78-33720
ROHDE, R. W. N78-33209
N78-33495
N78-33812
ROHRS, C. E. N78-33784
ROLAND, D. P. N78-33138
RORDEN, L. H. N78-33713
ROSEMEYER, B. N78-33821
ROSENFELD, A. N78-33381
ROSENFELD, Y. N78-33762
ROSENTHAL, R. N78-33877
ROSS, D. N78-33235
ROSS, M. C. N78-33536
ROSS, R. E. N78-34001
ROWLAND, J. F. B. N78-33281
ROZANSKY, M. I. N78-33433
ROZNER, A. G. N78-33770
RUBIN, S. M. N78-33081
RUPERT, J. G. N78-33082
N78-33750
N78-33670
N78-33671
N78-33331
N78-33947
N78-33962
N78-33497
RUPP, M. E. **SINGH, P. J.**
RUSSELL, P. B. **SINGPURWALLA, N. D.**
RUSSELL, S. F. **SIVERTSON, W. E., JR.**
RUSZALA, F. A. **SLIEMERS, F. A.**
RUTHRUFF, T. L. **SLOVIC, P.**
RYBICKI, E. F. **SMIDDY, M.**
SMITH, A. N.

S

SACKS, I. J. N78-33589
SADEH, W. Z. N78-33386
SAFAVI-NAINI, S. N78-33296
SAGAR, A. D. N78-33819
SAKAI, H. N78-33663
SALEM, S. L. N78-33801
SALIKUDDIN, M. N78-33248
SAMEJIMO, F. N78-33735
SAMUEL, C. N78-33621
SANCHEZ, R. J. N78-33492
SANDE, W. E. N78-33546
SANDIGE, R. S. N78-33749
SANTA, S. A. N78-33235
SANTAGO, P. N78-33287
SARASWAT, K. C. N78-33345
SARKINEN, S. H. N78-33722
SASAKI, Y. K. N78-33692
SAUNDERS, D. F. N78-33519
SAVAGE, R. N. N78-33932
SAVAGE, W. F. N78-33213
SCALA, E. N78-33093
SCHEFER, R. W. N78-33181
SCHEIDE, E. P. N78-33629
SCHELP, T. R. N78-33139
SCHMUGGE, T. J. N78-33284
SCHNEIER, R. N78-33266
SCHUCHMAN, L. N78-33072
SCHUMACHER, P. M. N78-33630
SCHWARTZ, C. R. N78-33668
SCOTT, R. L., JR. N78-33914
SCOTT, W. T. N78-33684
SCOZZAFAVA, J. N78-33540
SECHRIST, C. F., JR. N78-33653
SEFIC, W. J. N78-33053
SEIZINGER, D. E. N78-33628
SERLEMITSOS, P. J. N78-34013
SERNA, J. M. N78-33656
SESHAN, K. N78-33582
SETHURAMAN, J. N78-33465
SEYBERT, A. F. N78-33875
SEZGIN, M. N78-34002
SHAHANI, V. N78-33478
SHALLCROSS, F. V. N78-33916
SHANAHAN, A. J. N78-33718
N78-33719
SHAPIRO, M. N78-33555
SHAPIRO, M. M. N78-34026
SHARTS, B. N78-33133
SHAUGHNESSY, J. D. N78-33731
SHAW, H. J. N78-33348
SHAW, M. S. N78-33193
SHEARER, C. F. N78-33501
SHEEN, S. H. N78-33416
SHELDON, R. G. N78-33053
SHEPARD, S. H. N78-33467
SHEPP, T. A. N78-33924
SHERMAN, M. M. N78-33128
SHERWOOD, P. B. N78-33562
SHIVA, S. G. N78-33788
SHONKA, J. J. N78-33712
SHONYO, C. N78-33726
SHOUPP, W. J. N78-34004
SHRAGER, J. J. N78-33063
SHUART, M. J. N78-33153
SIEGEL, L. C. N78-33298
SIGMAR, D. J. N78-33938
SILBERBERG, R. N78-34026
SIMAK, R. S. N78-33450
SIMMONS, R. R. N78-33738
SIMON, C. W. N78-33743
SIMPSON, J. E. N78-33840
SIMPSON, R. W. N78-33963
SIMPSON, W. A. N78-33880
SINCLAIR, J. H. N78-33149
SINGH, J. J. N78-33407
N78-33538
N78-33268
N78-33465
N78-33466
N78-33511
N78-33535
N78-33837
N78-33933
SMITH, A. N. N78-33077
N78-33078
N78-33079
N78-33080
SMITH, A. X. N78-33346
SMITH, B. X. N78-33346
SMITH, C. A. N78-33876
SMITH, C. D. N78-33100
SMITH, D. N78-33166
N78-33171
N78-33977
SMITH, D. J. N78-33320
N78-33321
SMITH, J. N., JR. N78-33221
SMITH, M. F. N78-33439
N78-33440
N78-33441
N78-33603
N78-33604
N78-33605
N78-33606
N78-33881
N78-33882
N78-33883
N78-33884
N78-33918
N78-33919
N78-33920
N78-33921
N78-33922
N78-33974
SMITH, M. K. N78-33449
SMITH, P. R. N78-33394
SMITH, R. D. N78-33378
SMITH, R. H. N78-33120
SMITH, R. V. N78-33052
SMITH, V. D. N78-33464
SMITH, W. H. N78-33940
SNOW, E. A., III N78-33332
SNYDER, R. E. N78-33580
SOBEL, D. R. N78-33376
N78-33401
SOMMER, A. W. N78-33484
SOVEY, J. S. N78-33151
SPICER, C. W. N78-33630
SPITZIG, W. A. N78-33236
SPONG, D. A. N78-33942
SPRUIELL, J. E. N78-33218
SRINIVASA, D. S. N78-33515
STAFFORD, G. C. N78-33156
STAMPER, K. R. N78-33455
N78-33456
N78-33457
N78-33458
N78-33459
STANDLEE, L. A. N78-33640
STECKER, F. W. N78-34026
STEENKEN, W. G. N78-33103
STEIN, W. M. N78-33131
STEINFELD, J. I. N78-33899
STEITZ, P. N78-33576
N78-34008
STEPHENS, D. G. N78-33874
STETTNER, R. N78-33317
STEVANS, W. N78-33109
STEWART, C. V. N78-33299
STOCK, D. E. N78-33595
STOFFEL, T. L. N78-33683
STONE, R. H. N78-33148
STONE, R. S. N78-33320
N78-33321
STONESIFER, R. B. N78-33497
STROKOWSKI, A. J. N78-33385
STRONG, J. N78-33663

STUBENRAUCH, C. F. N78-33438
STUREK, W. B. N78-33059
STURSBERG, K. N78-33915
STUTZMAN, W. L. N78-33287
SUDAN, R. N. N78-33896
N78-33897
SUKYS, R. N78-33141
SULIDI-KONDRATYEV, Y. D. N78-33643
SULLIVAN, B. M. S. N78-33615
SULYMA, P. R. N78-33134
SUMMERS, D. M. N78-33641
SUNG, W. F. N78-33705
SUNU, W. G. N78-33187
SUNUNU, J. H. N78-33595
SWAIN, G. R. N78-33418
SWANK, J. H. N78-34013
SWANSON, R. E. N78-33333
SWANSON, R. K. N78-33464
SWARTWOUT, M. W. N78-33320
N78-33321
SWARTZ, P. F. N78-33717
SWARTZ, R. C. N78-33697
SWEARENGEN, J. C. N78-33209
N78-33495
SWEGLE, J. W. N78-33488
SWISDAK, M. M., JR. N78-33254
SYMINGTON, W. A. N78-33375
SYMONS, P. C. N78-33590

T

TAJIMA, T. N78-33934
TALBOTT, W. H. N78-33365
TAN, O. T. N78-33351
TANG, M. H. N78-33053
TANNER, K. I. N78-33258
TARASOVA, I. T. N78-34030
TARNOPOLSKIY, V. I. N78-33642
TASKEY, R. D. N78-33500
TAYLOR, D. N78-33576
TAYLOR, J. K. N78-33629
TEAGUE, M. L. N78-33184
TELLER, C. M. N78-33464
TENG, C. S. N78-33282
TESCH, W. A. N78-33103
THEDFORD, W. N78-33072
THOMAS, J. C. N78-33752
THOMAS, J. W. N78-33070
THOMAS, R. R. N78-33702
THOMAS, S. E. N78-33620
THOMPSON, C. H. N78-33436
THOMPSON, J. R. N78-33677
THOMPSON, L. D. N78-33223
THOMSON, B. N78-33787
TILOVE, R. B. N78-33759
N78-33760
N78-33843
TINCHER, W. C. N78-33184
TISDALE, G. N78-33821
TISHYADHIGAMA, S. N78-33830
TOLAND, R. H. N78-33492
TOMIYAMA, K. N78-33935
TOMLINSON, R. G. N78-33946
TRAHAN, R. E., JR. N78-33769
TRAYLOR, S., JR. N78-33116
N78-33117
N78-33118
TREASTER, A. L. N78-33387
TRIVISONNO, J. N78-33970
TROST, T. F. N78-33306
TROUT, E. M. N78-33737
TROWBRIDGE, J. C. N78-33250
TUGAL, H. N78-33695
TURNER, P. C. N78-33452
TURRIZIANI, R. V. N78-33087
TURUNEN, T. N78-33651
N78-33652
TYROLER, J. F. N78-33253

U

UCKAN, N. A. N78-33938
UMBARGER, C. J. N78-33721
URASEK, D. C. N78-33109
USRY, J. W. N78-33616
UTHE, E. E. N78-33670
N78-33671

V

VACHAL, J. D. N78-33088
VALENTINE, A. M. N78-33623
VANDENBROEK, C. J. J. N78-33470
VANDERHOFF, J. A. N78-33170
VANDERPIEPEN, H. N78-33509
VARNELL, G. L. N78-33343
VAS, I. E. N78-33056
VAUGHN, R. W. N78-33266
VEDAM, K. N78-33969
VENNUM, M. D. N78-33314
VILLAMIZAR, C. A. N78-33229
VILLENEUVE, A. T. N78-33646
VOELCKER, H. B. N78-33757
N78-33758
N78-33760
N78-33842
VOMVORIDIS, J. L. N78-33302

W

WADE, R. N78-33267
WAGNER, R. H. N78-33211
WAITE, W. P. N78-33644
WALLACE, L. A. N78-33635
WALLACE, R. N. N78-33352
WALZ, C. E. N78-33970
WANG, C. H. N78-33389
WANG, D. C. C. N78-33846
WANG, N. N78-33311
WANG, P. K. C. N78-33937
WANG, S. N78-33267
WANG, S. Y. N78-33953
WARD, D. W. N78-33874
WARD, M. D. N78-33081
N78-33082
WARING, R. C. N78-33182
WARK, D. N78-33595
WARNE, L. N78-34022
WARNER, H. H. N78-33124
WARRINGTON, D. N. N78-33090
WASHBURN, G. F. N78-33087
WASHBURN, J. N78-33582
WASHBURN, K. E. N78-34000
WASHBURN, S. A. N78-33349
WATERMAN, A. N78-33858
WATSON, D. A. N78-33575
WATT, A. D. N78-33840
WAYNE, R. A. N78-33351
WEBB, R. P. N78-33625
WECKSUNG, M. J. N78-33309
WEEKS, L. J. N78-33310
WEEKS, W. L. N78-33235
WEGMAN, R. F. N78-33975
WEINSTEIN, M. N78-33481
WEISSHAAR, T. A. N78-33964
WENG, S. L. N78-33721
WEST, L. N78-34006
WEST, S. G. N78-33177
WESTBROOK, C. K. N78-33138
WESTON, A. N78-33047
WESTON, R. P. N78-33978
WHEELER, G. E. WHILOCK, C. H. N78-33616
WHITE, K. R. N78-33414
WHITE, R. A. N78-33188
WHITE, W. B. N78-33699
WHITEHEAD, A. H., JR. N78-33060
N78-33061
WHITMAN, G. P. N78-33208
WHITNEY, J. M. N78-33154
WIEGEL, T. A. N78-33477
WIENER, S. A. N78-33631
WIER, T. W. N78-33267
WILCOX, W. W. N78-33212
WILEY, P. H. N78-33287
WILHEIT, T. T. N78-33512
WILKE, C. R. N78-33260
WILKES, W. R. N78-33940
WILLETT, T. N78-33821
WILLIAMS, D. L. N78-33503
WILLIAMS, M. D. N78-33625
WILLIAMS, R. K. N78-33219
WILLIAMSON, R. A. N78-33343
WILLMAN, W. W. N78-33820
WILLMERT, K. D. N78-33482
WILSON, B. A. N78-33965
WILSON, J. R. N78-33086
WILSON, R. L. N78-33716
WISNER, C. N78-33677
WITMER, E. A. N78-33454
WITTE, W. G. N78-33616
WITTENBERG, L. J. N78-33940
WOLCOTT, A. R. N78-33633
WOLF, D. E. N78-33686
WOLF, S. A. N78-33293
WOODLIFF, A. R. N78-33473
WOODS, D. N78-33429
WOOLLEY, J. P. N78-33876
WORKMAN, G. L. N78-33383
WORSTELL, M. H. N78-33596
WORTHEY, R. E. N78-33734
WORTHLEY, J. A. N78-33993
N78-33994
WRIGHT, R. P. N78-33679
WRIGHT, R. R. N78-33220
WU, J. S. N78-33801
WUNDER, R. N78-33572
WYLIE, R. A., JR. N78-33699
WYSKIDA, R. M. N78-33451

Y

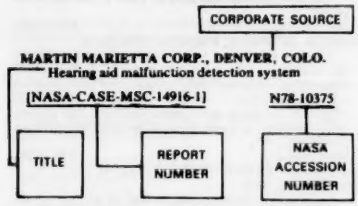
YAKOVLEV, O. I. N78-34017
YANEY, D. S. N78-33954
YANTA, W. J. N78-33059
YATES, E. C., JR. N78-33046
YATSULA, G. S. N78-33710
YILDIRIM, A. N78-33984
YOCUM, A. M. N78-33387
YORK, G. W. N78-33392
YOST, R. A. N78-33171
YOUNG, H. A. N78-33865
YOUSEF, M. A. S. E. E. N78-33474
YOUSHAW, R. A. N78-33199
YU, E. C. C. N78-33956
YU, Y. J. N78-33903
YUAN, W. W. N78-33180
YUNG, D. N78-33399
YURCHENKO, Y. F. N78-34031

Z

ZACKAY, V. F. N78-33223
ZELENY, P. C. N78-33755
ZHURAVLEV, V. A. N78-33730
ZIMMERMAN, K. L. N78-33838
ZIPKIN, P. H. N78-33774
ZOLNOWSKY, J. E. N78-33839
ZWICKER, H. R. N78-33426

CORPORATE SOURCE INDEX

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

ADAPT SERVICE CORP., READING, MASS.
Updating of ADAPT predictions of sunspot activity
[NASA-CR-150823] N78-34024

AEROCHEM RESEARCH LABS., INC., PRINCETON, N. J.
Experimental study of chemically reacting turbulent free shear layers
[FE-2446-4] N78-33398

AERODYNE RESEARCH, INC., BEDFORD, MASS.
Analysis of electron retarding potential analyzer measurements of vehicle skin potential in the PRECEDE experiment
[AD-A057250] N78-33347

AEROJET LIQUID ROCKET CO., SACRAMENTO, CALIF.
Dual throat thruster cold flow analysis
[NASA-CR-150822] N78-33142

AERONAUTICAL SYSTEMS DIV., WRIGHT-PATTERSON AFB, OHIO.
B-1 EMUX automated logic diagrammer demonstration program
[AD-A056964] N78-33092
Air Force aircrew training devices: Master plan
[AD-A056940] N78-33734

AEROSPACE CORP., EL SEGUNDO, CALIF.
Station keeping of the space shuttle in the vicinity of a deployed payload
[AD-A056109] N78-33136
Inventory of combustion-related emissions from stationary sources
[PB-282428/2] N78-33638

AEROTHERM ACUREX CORP., MOUNTAIN VIEW, CALIF.
Solar total energy system: Large scale experiment. Phase 2: Conceptual design
[SE-3986-1] N78-33566

AIR FORCE GEOPHYSICS LAB., HANSCOM AFB, MASS.
An observer's manual for the Air Force swept frequency interferometric radiometer
[AD-A056994] N78-33411
The behavior of gridded spherical and planar electron probes in a non-Maxwellian plasma
[AD-A056961] N78-33933

AIR FORCE HUMAN RESOURCES LAB., BROOKS AFB, TEX.
Effects of platform motion, visual and G-seat factors upon experienced pilot performance, in the flight simulator
[AD-A055691] N78-33739
G-seat component development
[AD-A055533] N78-33740
Emulation of an advanced G-seat on the advanced simulator for pilot training
[AD-A055532] N78-33741

AIR FORCE INST. OF TECH., WRIGHT-PATTERSON AFB, OHIO.
Mechanization of blended A sub N mode for CCV YF-16
[AD-A056553] N78-33089
Development of a symbology exerciser for display generation and analysis on the visually-coupled airborne systems simulator [VCASS]
[AD-A055464] N78-33124
Identification of periodically amplitude modulated targets
[AD-A056516] N78-33299
Quantitative predictions of length in the Mueller-Lyer illusion as perceived by the human visual system
[AD-A055706] N78-33732
Anomalous transport coefficients due to the ion-ion two-stream plasma microinstability
[AD-A056542] N78-33930

AIR FORCE MATERIALS LAB., WRIGHT-PATTERSON AFB, OHIO.
Moisture diffusion in fiber reinforced composites
[AD-A056557] N78-33154

AIR POLLUTION TECHNOLOGY, INC., SAN DIEGO, CALIF.
Design criteria for rocket exhaust scrubbers
[PB-282255/9] N78-33637

AIRCO, INC., MURRAY HILL, N. J.
Report on work performed under P. O. 9667503, task 2
[UCRL-13829] N78-33268

AIRESEARCH MFG. CO., PHOENIX, ARIZ.
Pollution Reduction Technology Program for small jet aircraft engines, phase 2
[NASA-CR-159415] N78-33104
Coal fired prototype high temperature continuous flow heat exchanger. AF-684 research project 545-1
[EPRI-AF-684] N78-33391

AIRESEARCH MFG. CO., TORRANCE, CALIF.
Study of heat engine/flywheel: Hybrid propulsion configuration with electrical transmission system, phase 1
[ALO-41/1] N78-33560

ALABAMA A & M UNIV., HUNTSVILLE.
A comparison of hardware description languages
[NASA-CR-157762] N78-33788

ALABAMA UNIV. IN HUNTSVILLE.
Container cushioning design engineer users manual: CDC-6600 FORTRAN version, volume 2
[AD-A057245] N78-33451

ALUMINUM CO. OF AMERICA, ALCOA CENTER, PA.
Catalog information on the performance of aluminum in sea water
[PNL-2606] N78-33211

AMES LAB., IOWA.
Separation of metal ions using an o-hydroxypropiophenoxime resin
[IS-T-801] N78-33178
Forced-flow chromatographic determination of calcium and magnesium with continuous spectrophotometric detection
[IS-T-806] N78-33179

ANALYTIC SCIENCES CORP., READING, MASS.
Missile aerodynamic parameter and structure identification from flight test data
[AD-A056343] N78-33055

APPLIED PHYSICS LAB., JOHNS HOPKINS UNIV., LAUREL, MD.
System definition and investigation of the on site processing of en route sensor signals. Addendum: Investigation into possible en route on site beacon ring around discriminants
[AD-A056941] N78-33070

ARGONNE NATIONAL LAB., ILL.
Compilation of fatigue data for Incoloy 800 alloys
[ANL/MSD-78-3] N78-33217
Nondestructive evaluation techniques for high-temperature ceramic components
[ANL/MSD-78-5] N78-33240
Superconducting transistor
[CONF-780339-1] N78-33359
Analysis of heat transfer in horizontal tube falling film evaporators
[ANL-OTEC-78-1] N78-33399
Feasibility study of acoustic ultrasonic flowmeters for solid/gas systems
[ANL-FE-49622-TM01] N78-33416
Design of CPC photovoltaic solar collectors
[CONF-780114-8] N78-33585
Use of microwave energy in conjunction with fluidized bed reactors
[CONF-771125-3] N78-33588
Local measurements in two-phase liquid-metal MHD
[CONF-780336-2] N78-33943

ARINC RESEARCH CORP., ANNAPOLIS, MD.
Description of a model for evaluating operational performance of communications system
[AD-A057199] N78-33313

ARIZONA STATE UNIV., TEMPE.
Conversion of cellulosic and waste polymer material to gasoline
[COO-2982-21] N78-33257
Analysis of parallel system design using context-free grammars
N78-33771

ARIZONA UNIV., TUCSON.
Extensions of AHPL and optimization of the AHPL compiler for MSI/LSI design
N78-33333

ARKANSAS UNIV., FAYETTEVILLE.
Preliminary geologic evaluation of L-band radar imagery: Arkansas test site
[NASA-CR-157761] N78-33644

ARMY AEROMEDICAL RESEARCH LAB., FORT RUCKER, ALA.
Visual performance/workload of helicopter pilots during instrument flight
[AD-A055424] N78-33738

ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, ABERDEEN PROVING GROUND, MD.
Photodissociation cross sections for Ar sub 2+, Kr sub 2+, and Xe sub 2+ at 3.0 and 3.5 eV
[AD-A057195] N78-33170
Investigation into the effects of weapon setback on various materials and geometries
[AD-A057236] N78-33450
Youngdahl stress functions and quasi-static nonaxisymmetric thermal stresses in a finite cylinder
[AD-A057196] N78-33485

ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, DOVER, N. J.
A technique for assessing the durability of structural adhesives
[AD-A057197] N78-33235
Illumination requirements for target recognition and reacquisition as a function of field of view
[AD-A057235] N78-33252
The effects of changes in flare in intensity on the recognition probability of vehicular size targets
[AD-A057238] N78-33253
Analysis of impurities in composition B by thin layer chromatography
[AD-A056313] N78-33255

ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND, ST. LOUIS, MO.
Long-term hot-hardness characteristics of five through-hardened bearing steels
[NASA-TP-1341] N78-33196

ARMY CONSTRUCTION ENGINEERING RESEARCH LAB., CHAMPAIGN, ILL.
Analysis of a nonlinear electromagnetic field penetration problem
[AD-A056424] N78-33312
Computer-aided environmental impact analysis for industrial, procurement, and research Development, test, and evaluation activities: User's manual
[AD-A056997] N78-33620

ARMY ELECTRONICS COMMAND, FORT MONMOUTH, N. J.
Electrochemical reduction of thionyl chloride in solutions containing lithium tetrachloroaluminate
[AD-A056123] N78-33167

ARMY ELECTRONICS RESEARCH AND DEVELOPMENT COMMAND, FORT MONMOUTH, N. J.
Unstable resonators for Army laser designators
[AD-A056432] N78-33430
A four-channel polarimeter to measure nanosecond laser pulses
[AD-A056423] N78-33431

Unstable resonator retrofitted handheld laser designator
[AD-A057248] N78-33432
ARMY MATERIEL SYSTEMS ANALYSIS ACTIVITY, ABERDEEN PROVING GROUND, MD.
Reliability, availability and maintainability analysis of the AQUILA remotely piloted vehicle system
[AD-A056942] N78-33090
ARMY MISSILE RESEARCH AND DEVELOPMENT COMMAND, REDSTONE ARSENAL, ALA.
Mie theory for non spherical particles
[AD-A056435] N78-33305
ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT CENTER, FORT BELVOIR, VA.
Electrical conductivity of selected graphite intercalation compounds in the temperature range between 4 and 300 Kelvin degrees
[AD-A056429] N78-33350
ARMY TANK-AUTOMOTIVE RESEARCH AND DEVELOPMENT COMMAND, WARREN, MICH.
Pulsed holographic analysis of large vibrating vehicle components
[AD-A056439] N78-33410
Ultrasonic lubrication
[AD-A056050] N78-33448
ARMY TEST AND EVALUATION COMMAND, ABERDEEN PROVING GROUND, MD.
Aircraft defogging and defrosting [transparent area]
[AD-A056976] N78-33094
Electromagnetic radiation analysis
[AD-A056647] N78-33294
ARMY TROOP SUPPORT AND AVIATION MATERIEL READINESS COMMAND, ST. LOUIS, MO.
Bell UH-1H RAM/LOG report
[AD-A057231] N78-33091
ATHENS COLL., ALA.
Vapor transport mechanisms
[NASA-CR-150824] N78-33383
ATLANTIC SCIENCE CORP., RIVERDALE, MD.
Ionospheric refraction corrections in the GTDS for satellite-to-satellite tracking data
[NASA-CR-156834] N78-33654
ATMOSPHERIC SCIENCES LAB., WHITE SANDS MISSILE RANGE, N. MEX.
Spectrophone analysis of gas samples obtained at field site
[AD-A057202] N78-33621
Calculation of atmospheric composition in the high latitude September stratosphere
[AD-A055160] N78-33656
ABRES pretest atmospheric measurements
[AD-A055285] N78-33657
The growth and prediction of nocturnal inversions
[AD-A056993] N78-33682
ATOMICS INTERNATIONAL DIV., GOLDEN, COLO.
Interaction of Xenon light with the surface of 304 stainless steel
[RFP-2647] N78-33205
Effect of radiation and acids on thermal stability of ion exchange resins
[RFP-2652] N78-33238
AUBURN UNIV., ALA.
Effects of excess charge density on dielectric breakdown
N78-33325

B

BALLISTIC RESEARCH LABS., ABERDEEN PROVING GROUND, MD.
Measurements in the turbulent boundary layer of a yawed, spinning body of revolution at Mach 3.0 with a laser velocimeter and impact probe
[AD-A057237] N78-33059
User's manual for the BRL subroutine to calculate Bessel functions of integral order and complex argument
[AD-A056369] N78-33838
BATTELLE COLUMBUS LABS., OHIO.
System Avionics Value Estimation [SAVE]: An aid for avionics logistics-and-support-cost analyses
[AD-A056348] N78-33097
Review of the low-temperature properties of metals: A digest of selected literature
N78-33143
Review of the low-temperature properties of metals: A digest of selected literature
N78-33144
Computer-aided design and manufacturing for extrusion of aluminum, titanium and steel structural parts. Phase 2: Application to practical extrusions. Volume 1: Description of CAD/CAM systems for extrusion of structural shapes
[AD-A056965] N78-33200
Computer-aided design and manufacturing for extrusion of aluminum, titanium and steel structural parts. Phase 2: Application to practical extrusions. Volume 2: User's manual for ALEXTR system of computer programs for design and manufacture of flat-face dies for aluminum extrusion
[AD-A056966] N78-33201
Fuels from sugar crops
[TID-28191] N78-33259
Nondestructive evaluation of steam turbine rotors: An analysis of the systems and techniques utilized for inservice inspection
[EPRI-NP-744] N78-33469
Residual stresses at weld repairs in pressure vessels
[PB-281853/2] N78-33497
Evaluation available encapsulation materials for low-cost long-life silicon photovoltaic arrays
[NASA-CR-157758] N78-33535
Sampling and analytical methodology for atmospheric particulate nitrates
[PB-281933/2] N78-33630
BATTELLE PACIFIC NORTHWEST LABS., RICHLAND, WASH.
Compressed air energy storage advanced systems analysis
[PNL-2464] N78-33545
Economic feasibility of strontium-90 fueled heaters for use in cold regions
[PNL-2476] N78-33546
Analysis of federal incentives used to stimulate energy production: An executive summary
[PNL-2410] N78-33565
Biological effects of high strength electric fields on small laboratory animals
[HCP/T1830-03] N78-33706
Compilation and assessment of microwave bioeffects, AO-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system
[PNL-2634] N78-33720
BECHTEL CORP., SAN FRANCISCO, CALIF.
Terrestrial central station array life-cycle analysis support study
[NASA-CR-157772] N78-33534
BECHTEL INTERNATIONAL CORP., SAN FRANCISCO, CALIF.
Module/array interface study
[NASA-CR-157774] N78-33533
BELL HELICOPTER CO., FORT WORTH, TEX.
A data management system for weight control and design-to-cost
N78-33780
BENDIX CORP., KANSAS CITY, MO.
Telemetry test methods
[BDX-613-1811-REV] N78-33139
Effects of deburring contaminants on electroplating adhesion
[BDX-613-1757-REV] N78-33397
BIOMASS ENERGY INST., INC., WINNIPEG [MANITOBA].
Biomass energy success stories: A portfolio illustrating current economic uses of renewable biomass energy
[HCP/T0285-02] N78-33598
BIRMINGHAM UNIV. [ENGLAND].
Binary positive ion-negative ion mutual neutralization reactions
[AD-A056649] N78-33166
BLACK AND VEATCH CONSULTING ENGINEERS, KANSAS CITY, MO.
Solar-thermal conversion to electricity utilizing a central receiver, open-cycle gas turbine design
[EPRI-ER-652] N78-33587
BOEING CO., HUNTSVILLE, ALA.
Biological water quality monitoring using chemiluminescent and bioluminescent techniques
[NASA-CR-156830] N78-33702
BOEING COMMERCIAL AIRPLANE CO., SEATTLE, WASH.
Wing planform geometry effects on large subsonic military transport airplanes
[AD-A056124] N78-33088
BOEING COMPUTER SERVICES, INC., SEATTLE, WASH.
SDMS: A scientific data management system
N78-33783
RIM: A prototype for a relational information management system
N78-33785
BONNEVILLE POWER ADMINISTRATION, PORTLAND, OREG.
Electrical and biological effects of transmission lines: A review
[BPA-BIO-77-1] N78-33722
BOSTON UNIV., MASS.
Behavior of the ionospheric F-region during geomagnetic storms
[AD-A056978] N78-33664
BRIGHAM YOUNG UNIV., PROVO, UTAH.
Methanation catalysts: Activity, adsorption and degradation studies of nickel and nickel bimetallic catalysts for methanation
N78-33161
BROOKHAVEN NATIONAL LAB., UPTON, N. Y.
Amorphous semiconductors in photovoltaic and solar thermal conversion
[BNL-24216] N78-33584
BROWN UNIV., PROVIDENCE, R. I.
Large deviations for diffusions depending on small parameters: A stochastic control method
[AD-A055652] N78-33860
BUREAU OF LABOR STATISTICS, WASHINGTON, D. C.
Table producing language systems installation instructions, version 4.0
[PB-281376/4] N78-33802
Print control language, version 4.0: Users guide
[PB-281377/2] N78-33803
Table producing languages, version 4.0: Users guide. Including codebook language
[PB-281378/0] N78-33804
The development and uses of Table Producing Language
[PB-281379/8] N78-33805
BUREAU OF MINES, WASHINGTON, D. C.
Projects to expand fuel sources in Eastern states: An update of Information Circular 8725. Survey of Planned or proposed coal mines, coal and noncoal conversion plants, electric generating plants, oil refineries, uranium enrichment facilities, and related infrastructure, in states east of the Mississippi River [as of July 1977]
[BM-IC-8765] N78-33581
BUREAU OF RADIOLOGICAL HEALTH, ROCKVILLE, MD.
Physical mechanisms for biological effects of ultrasound
[PB-282234/4] N78-33725
BURNS AND MCDONNELL, KANSAS CITY, MO.
Assessment of the fuel cell's role in small utilities
[EPRI-EM-696-VOL-1] N78-33576
Assessment of the role of advanced technologies in small utilities
[EPRI-EM-696-VOL-2] N78-34008
BURNS AND ROE, INC., WOODBURY, N. Y.
USAF terrestrial energy study. Volume 3, part 2: Energy conservation systems handbook
[AD-A057252] N78-33542
BURT, HILL, KOSAR, RITTLEMAN, AND ASSOCIATES, BUTLER, PA.
Minimum Energy Dwelling [MED] workbook: An investigation of techniques and materials for energy conscious design
[SAN-1198-1] N78-33553

C

CALIFORNIA INST. OF TECH., PASADENA.
Interference effects on the drag of bluff bodies in tandem
N78-33038
Measurements of energy exchange between acoustic fields and non-uniform steady flow fields
N78-33249
Magnetic bubble domain wall dyanmics in gradient translation
N78-33334
Analytical studies of steady and non-steady motions of a bubbly liquid
N78-33375
Hysteresis in human binocular fusion: A second look
N78-33711
Measurement of transition probabilities for Mn I lines and the manganese solar abundance
N78-33890
Comparative studies of the steady state and RF properties of proximity effect bridges
N78-33961
CALIFORNIA POLYTECHNIC STATE UNIV., SAN LUIS OBISPO.
Research on the application of solar energy to industrial drying or dehydration processes
[ORO-5123-1] N78-33583
CALIFORNIA STATE AIR RESOURCES BOARD, SACRAMENTO.
California air pollution control laws
[PB-281786/4] N78-33632
CALIFORNIA UNIV., BERKELEY.
An experimental study of non-equilibrium free jet expansions of nitrogen
N78-33037
Vapor-liquid equilibria in multicomponent aqueous solutions of volatile electrolytes
N78-33157
Mass transport and acid-base generation in solution/membrane systems: Extension of Nernst-Planck treatment to electrolytic multicomponent systems
N78-33159
Kinetics of iron ore reduction
N78-33186
Learning from fire: A fire protection primer for architects
[PB-283163/4] N78-33277
The performance of digital matched filters for multilevel signals
N78-33280
Studies of avalanche injection of charge into SiO2 using gated diode structures
N78-33326
Optimized design of low-distortion monolithic wideband amplifiers
N78-33328

The effect of multipath interference on the performance of a digital matched filter
N78-33329

Strength and deformation analysis of concrete under multiaxial stresses
N78-33474

The nature and formation of nitrogenous air pollutant emissions from combustion systems
N78-33611

Optimization algorithms for computer aided design problems
N78-33769

Four FORTRAN programs for numerically solving Helmholtz's equation in an arbitrary bounded planar region
[LBL-7516] N78-33798

Input-output stability theory of interconnected systems
N78-33807

Dynamic ADI methods for elliptic equations with gradient dependent coefficients
N78-33826

The approximation of plane curves by means of circular-arc-based elements
N78-33829

General convergence theorems: Their relationships and applications
N78-33830

Fragmentation of relativistic light nuclei: Longitudinal and transverse momentum distributions
N78-33902

Modulated electron beam heating of a contact ionized lithium plasma in a mirror machine
N78-33924

Laser induced fluorescence in titanium oxide: Lifetimes, collisions, and intercombinations
N78-33925

Wavelength modulation spectroscopy of semiconductors
N78-33948

Thin-film metal-oxide-metal junction devices
N78-33953

The effect of dissolved oxygen concentration activated sludge process performance
N78-34002

Experiment definition and integration study for the accommodation of giant, passive detector of Exotic Particles In the Cosmic Rays [EPIC] payload on shuttle/spacelab missions
[NASA-CR-156842] N78-34025

CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.

Computational study of physical and chemical flame inhibition
[LBL-6899] N78-33181

Determination of the recovery stresses developed by shape memory alloys
[LBL-6884] N78-33216

Development of nickel-free austenitic stainless steels for ambient and cryogenic applications
[LBL-7397] N78-33223

Catalytic conversion of solvent refined coal to liquid products
[LBL-6807] N78-33258

Process development studies on the bioconversion of cellulose and production of ethanol
[LBL-6881] N78-33260

Cu/sub x/S-[Cd, Zn]S photovoltaic solar energy converters
[HCP/T7405-1] N78-33582

CALIFORNIA UNIV., DAVIS.

Measuring and predicting the dynamic effects of a confined thin metal plate pulse heated into the liquid-vapor regime
N78-33192

CALIFORNIA UNIV., IRVINE.

Characteristics of amplified spontaneous emissions in high-gain gas-laser amplifiers
N78-33419

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.

Sub-part-per-trillion detection of organics in aqueous solution by laser induced molecular fluorescence
[UCRL-80038] N78-33174

Detailed models of hydrocarbon combustion
[UCRL-80896] N78-33177

High temperature, noncontact material testing
[UCRL-80438] N78-33212

Development of alternate silicone potting compounds. Volume 2: Development of the primary alternate for Dow Corning's aerospace sealant, DC 93-119
[UCRL-52434-VOL-2] N78-33242

Development of alternate silicone potting compounds. Volume 1: Experimental program
[UCRL-52434-VOL-1] N78-33244

Computer simulation of plastic deformation in the Charpy V-notch impact test
[UCRL-80868] N78-33491

Stress-rupture life of Kevlar/epoxy spherical pressure vessels
[UCID-17755-PT-1] N78-33492

Dynamic response of a cyclindrical shell immersed in a potential fluid
[UCRL-52464] N78-33493

Analysis of off-guideway energy storage/propulsion systems for dual mode transit systems
[UCRL-80874] N78-33589

Atmospheric and Geophysical Sciences Division, Physics Department program report, FY 1977
[UCRL-51444-77] N78-33624

Data director RTOS manual
[UCID-17750] N78-33799

Plasma surface interactions in Q-enhanced mirror systems
[UCRL-80656] N78-33944

CALIFORNIA UNIV., LOS ANGELES.

Transient and failure analyses of porous zinc electrodes
N78-33187

Effect of a dc electric field on beam trapping
[AD-A056789] N78-33354

Application of inversion theory to new satellite systems for determination of the gravity field
[AD-A057188] N78-33666

CAT: A computer code for the automated construction of fault trees
[EPRI-NP-705] N78-33801

Excitation of large amplitude plasma waves by runaway electrons
[AD-A056788] N78-33934

Multiple stage optimal control problems with applications to plasma heating by neutral injection
[AD-A056856] N78-33935

Stimulated Raman scattering involving two plasma waves
[AD-A056855] N78-33936

Multidimensional nonlinear Langmuir waves
[AD-A056851] N78-33937

CALIFORNIA UNIV., RIVERSIDE.

Information theoretic methods for indicating the speed of convergence and approximation accuracy of distributions
N78-33845

CALIFORNIA UNIV., SAN DIEGO.

A perturbation analysis of the steady integral flow and heat transport of gases in rod bundles, Part 1: Asymptotic analysis of plane turbulent Couette-Poiseuille flows, Part 2
N78-33372

CALIFORNIA UNIV., SANTA CRUZ.

Regional flood analyses and land use planning in an area of inadequate data Santa Cruz County, California
N78-33501

CALMAC MFG. CO., ENGLEWOOD, N. J.

Certification and verification for Calmac flat plate solar collector
[NASA-CR-150784] N78-33532

CALSPAN CORP., BUFFALO, N. Y.

Application of photometric analyses for interpretation of Mars-Mariner VI and VII imagery
[NASA-CR-157757] N78-34019

CANTOR [IRWIN G.] OFFICE, NEW YORK, N. Y.

Investigation of alternate types of water-storage components to be utilized in conjunction with the ACES system
[ORNL/SUB-78/14233/1] N78-33578

CANYON RESEARCH GROUP, INC., WESTLAKE VILLAGE, CALIF.

Design, analysis, and interpretation of screening studies for human factors engineering research, revision
[AD-A056985] N78-33743

CARNEGIE-MELLON UNIV., PITTSBURGH, PA.

Effect of ultrasonic waves on the kinetics of polymerization
N78-33226

Automation of module set independent register-transfer level design
N78-33332

Programmed-waveform pulse-width modulation techniques for the control of converter harmonics
N78-33335

Significance of process variables on liquid effluent production in coal gasification
N78-33525

Change detection and analysis in multi-spectral images
N78-33746

Distributed data processing: Microcomputer elements and design aids
N78-33766

The ARGOS image understanding system
N78-33770

Design representation and consistency maintenance needs
N78-33777

Portability techniques for BLISS programs
[AD-A056066] N78-33795

A finite element method for problems involving the Helmholtz equation in two dimensional exterior regions
N78-33823

Clustering and classification of discrete data
N78-33846

Performance analysis of the Technology Chess Program
[AD-A056072] N78-33868

Study of ice growth in slightly undercooled water
N78-33871

Performance, evaluation, and specification for coherent optical processors
N78-33911

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO.

A viscous-inviscid interactive compressor calculation
N78-33040

Convection induced by G-jitter in rectangular enclosures aboard spacecraft
N78-33084

Optical gain in optically pumped methanol and its application to a FIR preamplifier
N78-33912

CATHOLIC UNIV. OF AMERICA, WASHINGTON, D. C.

A numerical study of upstream blocking and internal waves in a density stratified fluid
N78-33370

A theoretical investigation of signal acquisition and digital communication in a coupling-modulated carbon dioxide laser system
N78-33422

An investigation of the orthogonal collocation method with applications to some structural mechanics problems
N78-33476

Feature extraction in an adaptive multiclass pattern recognition system
N78-33818

Theoretical study of the differential positronium cross section with helium and argon targets
N78-33893

Energy spectra of double-scattered photons
N78-33904

CINCINNATI UNIV., OHIO.

Thermal and molecular effects on solid state behavior of rigid poly[vinylchloride]
N78-33227

CITY UNIV. OF NEW YORK.

A learning control system with application to flight systems
N78-33112

CIVIL AEROMEDICAL INST., OKLAHOMA CITY, OKLA.

Evaluation of seating and restraint systems and anthropomorphic dummies conducted during fiscal year 1977
[AD-A056905] N78-33737

CLARKSON COLL. OF TECHNOLOGY, POTSDAM, N.Y.

Automated resizing optimization of generally loaded planar frames via linear programming techniques
[AD-A056567] N78-33482

COLORADO SCHOOL OF MINES, GOLDEN.

Open cycle ocean thermal energy conversion: A preliminary engineering evaluation
[ALO-3723-76/3] N78-33575

COLORADO STATE UNIV., FORT COLLINS.

A visual investigation of turbulence in stagnation flow about a circular cylinder
[NASA-CR-3019] N78-33386

COLORADO UNIV., BOULDER.

Propagating modes on a buried leaky coaxial cable
[AD-A057253] N78-33308

Excitation of current on an infinite horizontal wire over the earth by an arbitrary electric dipole source
[AD-A057257] N78-33346

COMPLETION TECHNOLOGY CO., HOUSTON, TEX.

Geothermal well completions: An overview of existing methods in four types of developments
[SAND-78-7010] N78-33580

COMPUTER SCIENCES CORP., BAY ST. LOUIS, MISS.

Classification testing of composition A5 and selected pyrotechnics
[NASA-CR-157744] N78-33251

CONNECTICUT UNIV., STORRS.

Liquids from CO and H2 for energy storage
[EPRI-AF-689] N78-33175

Electronic structure of ternary alloys
[AD-A056356] N78-33198

The hydrothermal synthesis and crystal growth of hydroxyphosphates
N78-33947

Phonon scattering by dislocations
N78-33949

CORNELL UNIV., ITHACA, N. Y.

Communications for a mobile society: An assessment of new technology
[PB-281639/5] N78-33319

A mean spherical model for soft potentials: The hard core revealed as a perturbation
[NASA-CR-157771] N78-33381

Proceedings of the Second International Topical Conference on High Power Electron and Ion Beam Research and Technology, volume 1
[AD-A057218] N78-33896

Proceedings of the Second International Topical Conference on high Power Electron and Ion Beam Research and Technology, volume 2
[AD-A057219] N78-33897

CORTLAND LINE CO., N. Y.
Design and development of helicopter external cargo sling legs made with Kevlar
[AD-A056951] N78-33093
COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, PRETORIA [SOUTH AFRICA].
Measurement of the thermal conductivity of liquids
[PB-281706/2] N78-33183
CRITERION ANALYSIS, INC., DALLAS, TEX.
Appraisal of energy analysis
[EPRI-EA-504] N78-33547

D

DARTMOUTH COLL., HANOVER, N.H.
Mapping ultramafic rocks by computer analysis of digital LANDSAT data
N78-33504
The petrology of two late pliocene bentonites and the enclosing rocks, upper Siwalik Subgroup, northern Punjab and southwestern Kashmir, Pakistan
N78-33641
DAYTON UNIV. RESEARCH INST., OHIO.
A comparative study of two computational methods for calculating unsteady transonic flows about oscillating airfoils
[AD-A056946] N78-33058
Analysis of conjunctive rocketborne inflatable sphere and bead thermistor soundings
[AD-A056943] N78-33662
DCA RELIABILITY LAB., SUNNYVALE, CALIF.
Transistor step stress testing program, JANTX 2N2905A
[NASA-CR-150821] N78-33341
DECISION RESEARCH CORP., EUGENE, OREG.
Fault trees: Sensitivity of estimated failure probabilities to problem presentation
[AD-A057163] N78-33837
DEFENCE SCIENTIFIC INFORMATION SERVICE, OTTAWA [ONTARIO].
Canada in space
N78-33126
DEL WEST ASSOCIATES, INC., WOODLAND HILLS, CALIF.
Development of a crack growth rate test for quality control
[AD-A056373] N78-33484
DELAWARE UNIV., NEWARK.
Dynamic characterization of poroelastic materials
N78-33147
Electro-optical studies
[AD-A057062] N78-33169
DENVER UNIV., COLO.
Organizing to use a new telecommunications technology: Communications satellites and vocational rehabilitation
[PB-282283/1] N78-33323
DEPARTMENT OF ENERGY, BARTLESVILLE, OKLA.
Performance of gasoline and diesel fuels produced from COED syncrude
[BERC/RI-78/2] N78-33261
Performance characteristics of automotive engines in the United States. Second series, Report No. 1: 1976 Chevrolet Vega 140 [CID [2.3 liters], 2V
[PB-281774/0] N78-33455
Performance characteristics of automotive engines in the United States. Second series, report no. 2: 1976 Chevrolet 305 CID [5.0 liters], 2V
[PB-281775/7] N78-33456
Performance characteristics of automotive engines in the United States. Second series, report no. 3: 1977 Chrysler 225 CID [3.7 liters], 2V
[PB-281776/5] N78-33457
Performance characteristics of automotive engines in the United States. First series, report no. 12: 1975 Perkins diesel 247 CID [4.0 liters], FI
[PB-281777/3] N78-33458
Performance characteristics of automotive engines in the United States. First series, report no. 13: 1975 American Motors, 258 CID [4.2 liters], 1V
[PB-281778/1] N78-33459
DEPARTMENT OF ENERGY, LARAMIE, WYO.
Thermal conversion of oil-shale kerogen using CO and water at elevated pressures
[LERC-78/1] N78-33552
DEPARTMENT OF ENERGY, WASHINGTON, D. C.
Department of Energy position paper on alcohol fuels
[DOE/US-0001/1] N78-33256
Environmental Development Plan [EDP]. Enhanced gas recovery, FY 1977
[DOE/EDP-23] N78-33518
Voluntary business energy conservation program
[DOE/CS-0018/6] N78-33548
Environmental development plan for electric energy systems program, 1977
[DOE/EDP-0016] N78-33554
Environmental development plan for Conservation Research and Technology Program, 1977
[DOE/EDP-0017] N78-33555
Environmental development plan for the Division of Transportation energy conservation, 1977
[DOE/EDP-0018] N78-33556
Simple economic model for energy research and supply strategies, draft
[DOE/ER-0005/D] N78-33557
Demonstration project as a procedure for accelerating the application of new technology. Charpie task force report, volume 1
[DOE/RA-0003/1-VOL-1] N78-33563
Demonstration project as a procedure for accelerating the application of new technology. Charpie task force report, volume 2
[DOE/RA-0003/2-VOL-2] N78-33564
Environmental Development Plan [EDP]: Solar agricultural and industrial process heat, 1977
[DOE/EDP-0002] N78-33568
Environmental Development Plan [EDP]: Energy storage systems, FY 1977
[DOE/EDP-0015] N78-33579
Federal wind energy program. Program summary
[DOE/ET-0023/1] N78-33594
Environmental development plan for buildings and community systems, 1977
[DOE/EDP-0020] N78-33622
MAP3S: Studying the transport, transformation, and fate of atmospheric energy-related pollutants
[DOE/EV-0008/1] N78-33626
Evaluation of FIDC system
[NASA-CR-157763] N78-34007
DEVELCO, INC., SUNNYVALE, CALIF.
Underground data acquisition and telemetry system
[AD-A056317] N78-33138
DOUGLAS AIRCRAFT CO., INC., LONG BEACH, CALIF.
Primary Adhesively Bonded Structure Technology [PABST]. Phase 1: Detail design
[AD-A056857] N78-33095
Interactive composite joint design. Part 2: User's manual
[AD-A056712] N78-33449
DU PONT DE NEMOURS [E. I.] AND CO., AIKEN, S. C.
NURE geochemical investigations in the eastern United States
[DP-MS-77-101] N78-33517
DUKE UNIV., DURHAM, N. C.
Optimal branching probabilities and their relationship to computer network file distribution
N78-33809

E

ELECTRIC POWER RESEARCH INST., PALO ALTO, CALIF.
EPRI ductile fracture research review document
[EPRI-NP-701-SR] N78-33489
ELECTRONICS ENGINEERING GROUP [1842ND], SCOTT AFB, ILL.
Prototype High Frequency [HF] intercept capability for the tactical airbase weather element [TABWE]
[AD-A055685] N78-33292
Data Network Referee [DNR] concept report
[AD-A056960] N78-33814
EMMANUEL COLL., BOSTON, MASS.
Investigation of micropulsation activity. 1: MAGAF system additions. 2: Data analysis
[AD-A056716] N78-33661
ENERGY DEVELOPMENT ASSOCIATES, MADISON HEIGHTS, MICH.
Development of high-efficiency cost-effective, zinc-chlorine batteries for utility peak-shaving, 1976
[EPRI-EM-711] N78-33590
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION, BARTLESVILLE, OKLA.
Effects of catalytic reactors on diesel exhaust composition
[PB-281083/6] N78-33628
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION, WASHINGTON, D. C.
ERDA facilities: A national resource for resolving energy problems
[ERDA-77-80] N78-33597
ENERGY RESEARCH CORP., DANBURY, CONN.
Reversible metal hybride-air fuel cell
[AD-A056591] N78-33540
A 1.5 kW methanol fuel cell powerplant
[AD-A057145] N78-33541
ENGINEERING SOCIETIES COMMISSION ON ENERGY, INC., WASHINGTON, D. C.
ESCOE information retrieval system. System description and operation
[FE-2468-26] N78-33985
ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D. C.
Rapid techniques for calculating the Pollution Standards Index [PSI]
[PB-282028/0] N78-33635
ENVIRONMENTAL RESEARCH AND TECHNOLOGY, INC., CONCORD, MASS.
Development of techniques for short-range precipitation forecasts
[AD-A057153] N78-33680
ENVIRONMENTAL SCIENCES RESEARCH LAB., RESEARCH TRIANGLE PARK, N.C.
Non-extractive electro-optical measurement of jet-engine emissions
[AD-A056783] N78-33105
User's guide for PAL A Guassian-plume algorithm for point, area, and line sources
[PB-281306/1] N78-33627
EXXON RESEARCH AND ENGINEERING CO., LINDEN, N. J.
Catalyst sintering studies
[EPRI-EM-661] N78-33577

F

FACTORY MUTUAL RESEARCH CORP., NORWOOD, MASS.
Hazardous material spills: A documentation and analysis of historical data
[PB-281090/1] N78-33631
FEDERAL-STATE LAND USE PLANNING COMMISSION FOR ALASKA, ANCHORAGE.
Land use planning issues and the Alaska gas pipeline: A report to the President
[PB-281327/7] N78-33522
FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D. C.
The FAA concept for a Beacon Collision Avoidance System [BCAS]. Volume 1: Executive summary
[AD-A056930] N78-33072
Engineering and development program plan: Discrete Address Beacon System [DABS]
[AD-A057122] N78-33073
Engineering and development program plan: Advanced Integrated Flight Systems [AIFS]
[AD-A056770] N78-33119
FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D. C.
Relationship between noise figures and other performance characteristics of UHF TV receivers
[PB-281172/7] N78-33318
Alternatives for future personal radio services, volume 1
[PB-280938/2] N78-33320
Alternatives for future personal radio services, volume 2
[PB-280939/0] N78-33321
FEDERAL ENERGY ADMINISTRATION, WASHINGTON, D. C.
Federal-assistance programs and energy-development-impacted municipalities
[FEA/D-77/039] N78-33549
FEDERAL HIGHWAY ADMINISTRATION, WASHINGTON, D.C.
National highway inventory and performance summary-from the 1976 national highway inventory and performance study
[PB-281101/6] N78-34009
FITZPATRICK ENGINEERING, SANTA BARBARA, CALIF.
Vehicle integration and evaluation of advanced restraint systems. Restraint system analysis report
[PB-281475/4] N78-33744
FORD MOTOR CO., DEARBORN, MICH.
Advanced program weight control system
N78-33779
FOSTER-MILLER ASSOCIATES, INC., WALTHAM, MASS.
Shake testing of vehicles through recorded simulation control scheme, volume 1
[AD-A056543] N78-33792
Recorded simulation control scheme: User's manual, volume 2, supplement
[AD-A056544] N78-33793
FRANKLIN INST. RESEARCH LABS., PHILADELPHIA, PA.
The conceptual framework for a comprehensive and continuing STI resource inventory
[PB-282345/8] N78-33999

G

GENERAL ACCOUNTING OFFICE, WASHINGTON, D. C.
Operational testing of Air Force systems requires several improvements
[PB-281796/3] N78-33129
Benefits derived from the outer continental shelf environmental studies program are questionable
[PB-281782/3] N78-33520
Lower Cook Inlet: Another example of more data needed for appraising outer continental shelf oil and gas resources
[PB-281769/0] N78-33521
The multiprogram laboratories: A national resource for nonnuclear energy research, development, and demonstration
[PB-281265/9] N78-33607
Department of energy's consolidation of information processing activities needs more attention
[PB-281269/1] N78-33996

Agencies, implementation of and compliance with the Privacy Act can be improved
[PB-281768/2] N78-33997
GENERAL ATOMIC CO., SAN DIEGO, CALIF.
Temperature dependence of hydrogen sputtering of carbon coatings on platinum
[GA-A-14608] N78-33221
GENERAL DYNAMICS/FORT WORTH, TEX.
An investigation of wing buffeting response at subsonic and transonic speeds: Phase 1: F-111A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152109] N78-33113
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152110] N78-33114
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 1: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152111] N78-33115
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2 F-3A flight data analysis. Volume 1: Summary of technical approach, results and conclusions
[NASA-CR-152112] N78-33116
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 2: Plotted power spectra
[NASA-CR-152113] N78-33117
An investigation of wing buffeting response at subsonic and transonic speeds. Phase 2: F-111A flight data analysis. Volume 3: Tabulated power spectra
[NASA-CR-152114] N78-33118
GENERAL ELECTRIC CO., CINCINNATI, OHIO.
Redundant disc
[NASA-CASE-LEW-12496-1] N78-33101
Blade row dynamic digital compression program. Volume 2: J85 circumferential distortion redistribution model, effect of Stator characteristics, and stage characteristics sensitivity study
[NASA-CR-134953] N78-33103
Rolling element fatigue testing of gear materials
[NASA-CR-135450] N78-33463
Evaluation of cyclic behavior of aircraft turbine disk alloys
[NASA-CR-159433] N78-33478
GENERAL ELECTRIC CO., PHILADELPHIA, PA.
PLACE: Post LANDSAT D Advanced Concept Evaluation
[E78-10156] N78-33506
GENERAL ELECTRIC CO., SCHENECTADY, N. Y.
Hot corrosion/erosion testing of materials for applications for advanced power conversion systems using coal-derived fuels. Task 2. Evaluation of turbine materials for use in a coal-fired fluidized bed combustion environment
[FE-2326-20] N78-33210
Floating substrate process: Large-area silicon sheet task low-cost solar array project
[NASA-CR-157759] N78-33265
GENERAL ELECTRIC CO., ST. PETERSBURG, FLA.
Calcium chromate synthesis: Process variables study
[GEPP-372] N78-33176
GENERAL MOTORS CORP., DETROIT, MICH.
Associative programming language and virtual associative access manager
N78-33781
GENERAL MOTORS CORP., GOLETA, CALIF.
The 15kW general purpose power conditioner [frequency changer]. AC-DC section
[AD-A056302] N78-33353
GEOLOGICAL SURVEY, RESTON, VA.
Table of field numbers, localities, and descriptions of source materials for monazite-bearing concentrates from the Southeastern Atlantic States
[PB-281684/1] N78-33669
GEOPHYSICAL OBSERVATORY, SODANKYLA [FINLAND].
Multifreqency riometer measurements at high latitudes
[REPT-27] N78-33285
A new Finnish ionosonde IS-14
[REPT-28] N78-33648
The onset of an auroral absorption substorm
[REPT-24] N78-33649
Studies of the onset of an auroral absorption substorm
[REPT-26] N78-33650
Some properties of high latitude sporadic E
[REPT-29] N78-33651
High-latitude ionospheric studies in Finland
[REPT-25] N78-33652
GEORGE WASHINGTON UNIV., WASHINGTON, D. C.
Effect of microstructure on fatigue properties of Ti-6Al-4V
N78-33189
Viscous entrainment of mass and energy in fluid dynamic energy separation
N78-33376
Viscous entrainment of mass and energy in fluid dynamic energy separation
[PB-281759/1] N78-33401
Estimation and testing of hypotheses for distributions in accelerated life tests
[AD-A056096] N78-33465
The Gini index, the Lorenz curve, and the total time on test transforms
[AD-A056095] N78-33466
Annoyance due to the interaction of community noise sources
N78-33613
The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain
N78-33701
System design of parallel microprocessors for solving partial differential equations
N78-33747
Evaluating strategies for Newton's method using a numerically stable generalized inverse algorithm
N78-33833
GEORGIA INST. OF TECH., ATLANTA.
Effects of ignition sources and fire retardants on material ignition
[PB-281451/5] N78-33184
Low cycle corrosion fatigue and corrosion fatigue crack propagation of high strength 7000-type aluminum alloys
N78-33191
Application of impedance tube technique in the measurement of burning solid propellant admittances
N78-33248
Parameter estimation for generator simulation studies
[AD-A057006] N78-33351
Applications of polarization-diversity radar and lidar in meteorology
[AD-A056571] N78-33678
Fast neutron depth dose distributions in a heterogeneous phantom
N78-33712
GEORGIA UNIV., ATHENS.
Studies of electrogenerated chemiluminescence
N78-33162
Progressive censoring on four-parameter Weibull distribution
N78-33852
GULF RESEARCH AND DEVELOPMENT CO., PITTSBURGH, PA.
Passenger car fuel economy in short trip operation
[COO-4248-1] N78-33592
GUSTINCIC [J. J.] CONSULTING ENGINEER, MARINA DEL REY, CALIF.
An aircraft radiometer front end, addendum
[NASA-CR-157777] N78-33405

H

HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
Lithium literature review: Lithium's properties and interactions
[HEDL-TME-78-15] N78-33180
HARRIS CORP., MELBOURNE, FLA.
Telescoping columns
[NASA-CASE-LAR-12195-1] N78-33446
HAWAII INST. OF GEOPHYSICS, HONOLULU.
Conversion from film to magnetic cassette recording for current meter
[AD-A056962] N78-33409
HONEYWELL, INC., MINNEAPOLIS, MINN.
Independent stability and control analysis of navigation development satellites for the global positioning system. Volume 1: Technical report
[AD-A056811] N78-33081
Independent stability and control analysis of navigation development satellites for the global positioning system. Volume 2: Appendixes
[AD-A056812] N78-33082
Development of flat-plate solar collectors for the heating and cooling of buildings: Executive summary
[NASA-CR-134804] N78-33527
HONEYWELL ELECTRO-OPTICS CENTER, LEXINGTON, MASS.
Improved detectivity of pyroelectric detectors
[NASA-CR-158917] N78-33406
HOUSTON CHEMICAL CO., CORPUS CHRISTI, TEX.
Solar heat transport fluid
[NASA-CR-150806] N78-33530
HUGHES AIRCRAFT CO., CULVER CITY, CALIF.
Geosynchronous Microwave Atmospheric Sounding Radiometer [MASR] antenna feasibility study. Volume 3: Antenna feasibility
[NASA-CR-156825] N78-33646
HUGHES RESEARCH LABS., MALIBU, CALIF.
Ion implantation of wide bandgap semiconductors
[AD-A056125] N78-33968
HUMAN ENGINEERING LABS., ABERDEEN PROVING GROUND, MD.
An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance
[AD-A057113] N78-33733

I

IBM FEDERAL SYSTEMS DIV., OWEGO, N. Y.
Standard modular power supplies for avionics
[AD-A057159] N78-33100
IDAHO NATIONAL ENGINEERING LAB., IDAHO FALLS.
Residential space heating cost: Geothermal vs conventional systems
[TREE-1182] N78-33567
IIT RESEARCH INST., CHICAGO, ILL.
Turbine engine particulate emission characterization, phase 2
[AD-A057370] N78-33106
ASME report on chemical effects of lubrication in contact fatigue, volume 2
[PB-280980/4] N78-33245
ILLINOIS UNIV. AT URBANA-CHAMPAIGN, URBANA.
Desorption and surface diffusion: Nitrogen on tungsten [110]
[AD-A056346] N78-33165
Luminescent decay and spectra of impurity-activated alkali halides under high pressure
[COO-1198-1191] N78-33173
Machine casting of ferrous alloys
[AD-A056824] N78-33204
Source radiation in the presence of smooth convex bodies
[AD-A056645] N78-33296
Binary sequences for spread-spectrum multiple-access communication
[AD-A056552] N78-33297
Hardware design of a digital single-sideband generator
[AD-A057033] N78-33303
Architecture for multiple instruction stream LSI processors
[AD-A056110] N78-33751
A computer hardware design language for multiprocessor systems
[AD-A056111] N78-33794
ILLINOIS UNIV., URBANA.
A distribution model for the aerial application of granular agricultural particles
[NASA-CR-157745] N78-33048
Phonon thermal transport metallic glasses below 100 K
[COO-1198-1205] N78-33239
Nuclear pumping of a neutral carbon laser
[COO-2007-94] N78-33434
Nuclear pumping of a neutral carbon laser
[NASA-CR-157728] N78-33435
Theoretical and experimental studies of the atmospheric sodium layer
[NASA-CR-157770] N78-33653
ILLINOIS UNIV., URBANA-CHAMPAIGN.
Theory, computer program, and illustrative examples for the two-dimensional boundary layer flow of ideal gases
[AD-A056308] N78-33390
INDIANA UNIV. AT BLOOMINGTON.
Development and characterization of miniature inductively coupled plasma source for atomic emission spectrometry
[AD-A056139] N78-33932
INFORMATICS-PMI, INC., PALO ALTO, CALIF.
X10: A FORTRAN direct access data management system
N78-33784
INNSBRUCK UNIV. [AUSTRIA].
Monotone steady-state potential distributions in the standard collisionless plane diode model of the single-ended Q-machine
[UNICP-FSP-78/1] N78-33931
INSTITUTE FOR ENERGY ANALYSIS, OAK RIDGE, TENN.
Limits to energy conservation in chemical processes
[ORAU/IEA-78-6[M]] N78-33550
INSTITUTE FOR TELECOMMUNICATION SCIENCES, BOULDER, COLO.
Minimum antenna dimensions for satellite-communication earth stations
[PB-282109/8] N78-33324
INSTITUTO DE PESQUISAS ESPACIAIS, SAO PAULO [BRAZIL].
Development of heavily vegetated area in Brazil
[E78-10157] N78-33507
INTERNATIONAL BUSINESS MACHINES CORP., OSWEGO, N.Y.
Program documentation for the terrain and flight dynamics program
[AD-A056116] N78-33742
INTERNATIONAL BUSINESS MACHINES CORP., YORKTOWN HEIGHTS, N. Y.
A design-interpretation analysis of natural English with applications to man-computer interaction
[AD-A056121] N78-33752
IOWA INST. OF HYDRAULIC RESEARCH, IOWA CITY.
Thick axisymmetric boundary layer and near wake of a low-drag body of revolution
[AD-A057158] N78-33057

IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
A method of detecting and characterizing subsurface layers by means of electromagnetic depth sounding
N78-33279
Spectral analysis methods for noisy sampled-data systems
N78-33331
A toroidal fusion reactor design based on the reversed-field pinch
N78-33926
Precipitation kinetics of a continuous precipitator, with application to the precipitation of ammonium polyuranate
N78-33951
ITEK CORP., LEXINGTON, MASS.
Dielectric and optical properties of thin films
[AD-A056822] N78-33971
ITT DEFENSE COMMUNICATIONS DIV., NUTLEY, N.J.
Phased array antenna amplifier exploratory development model [100 watts]
[AD-A056173] N78-33301

J

JET PROPULSION LAB., CALIF. INST. OF TECH., PASADENA.
Coal desulfurization
[NASA-CASE-NPO-14272-1] N78-33164
Thermoplastic rubber comprising ethylene-vinyl acetate copolymer, asphalt and fluxing oil
[NASA-CASE-NPO-88351] N78-33228
Feasibility demonstration for electroplating ultra-thin polyimide film
[NASA-CR-157775] N78-33266
An aircraft radiometer front end, addendum
[NASA-CR-157777] N78-33405
Hydrogen-fueled engine
[NASA-CASE-NPO-13763-1] N78-33526
Module/array interface study
[NASA-CR-157774] N78-33533
Terrestrial central station array life-cycle analysis support study
[NASA-CR-157772] N78-33534
Radar observations of a volcanic terrain: Askja Caldera, Iceland
[NASA-CR-157765] N78-33645
Optical probe
[NASA-CASE-NPO-14247-1] N78-33715
Tissue identification by ultrasound
[NASA-CR-157776] N78-33716
A parameter estimation subroutine package
[NASA-CR-157766] N78-33789
Plural output optimetric sample cell and analysis system
[NASA-CASE-NPO-10233-1] N78-33913
Evaluation of FIDC system
[NASA-CR-157763] N78-34007
Preliminary studies of electromagnetic sounding of cometary nuclei
[NASA-CR-157764] N78-34022
JOHN CARROLL UNIV., CLEVELAND, OHIO.
Heat pulse propagation characteristics in N-type In As
[AD-A057243] N78-33970
JOHNS HOPKINS UNIV., BALTIMORE, MD.
Effects of nitrogen dioxide on pulmonary function in human subjects
[PB-281186/7] N78-33723
The application of Doubly Stochastic Poisson Process estimation techniques to optical intensity estimation for Gaussian optical fields
N78-33909
JOINT INST. FOR LAB. ASTROPHYSICS, BOULDER, COLO.
Research in laser processes
[AD-A056 10] N78-33427
JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation
[JPRS-71910] N78-33727
Cellular and molecular effects and the mechanism of action of microwave electromagnetic fields on biological systems
N78-33728
Biomedical effects of millimeter radio waves
N78-33729
The combined effect of an SHF field and an unfavorable microclimate on the body
N78-33730
Translations on USSR science and technology: Physical sciences and technology, no. 49
[JPRS-71896] N78-34028
Laser light source illuminating device design features discussed
N78-34029
Two-channel high-speed drive for an optical sighting device, operating under conditions of a random moment of load on the output shaft
N78-34030
Functional relationship of angular aberrations for systems with inhomogeneous media
N78-34031
Biological experiments on board Salyut-6
N78-34032
Pulsations and expansion of the earth: A possible key to an understanding of its tectonic development and volcanism in the phanerozoic
N78-34033
Soviet laser spectroscopy research reviewed
N78-34034

K

KAMAN AEROSPACE CORP., BLOOMFIELD, CONN.
Theoretical study of multicyclic control of a controllable twist rotor
[NASA-CR-151959] N78-33085
KAMAN SCIENCES CORP., COLORADO SPRINGS, COLO.
Phoenix House: Solar-assisted heat pump system evaluation
[EPRI-ER-712] N78-33574
KANSAS UNIV., LAWRENCE.
Ecosystem mapping by interpretation of landscapes from satellite imagery
N78-33503
KANSAS UNIV. CENTER FOR RESEARCH, INC., LAWRENCE.
An investigation of drag reduction for tractor trailer vehicles
[NASA-CR-144877] N78-33444
KENT STATE UNIV., OHIO.
The zonal matching problem
N78-33867
KENTUCKY UNIV., LEXINGTON.
Natural convection in a thermally stratified fluid
N78-33373
Measurement and analysis of flow in ducts and rod bundles
N78-33377
Optimum fatigue resistant frames for random base excitation
N78-33477
Maximum modified likelihood estimation of population size
N78-33858
Time-resolved production and detection of reactive atoms
N78-33895
KING RESEARCH, INC., ROCKVILLE, MD.
Systems analysis of scientific and technical communication in the United States: The electronic alternative to communication through paper-based journals
[PB-281847/4] N78-33986
Systems analysis of scientific and technical communication in the United States. Annex 1: Communication functions in science and technology
[PB-281848/2] N78-33987
Systems analysis of scientific and technical communication in the United States: Annex 2: The current practices
[PB-281849/0] N78-33988
Systems analysis of scientific and technical communication in the United States. Annex 3: An electronic alternative
[PB-281850/8] N78-33989
Systems analysis of scientific and technical communication in the United States. Annex 4: The cost model
[PB-281851/6] N78-33990
KRALL MANAGEMENT, INC., RADNOR, PA.
The conceptual framework for a comprehensive and continuing STI resource inventory
[PB-282345/8] N78-33999

L

LEHIGH UNIV., BETHLEHEM, PA.
Cooling rate variations within the group IV A iron meteorites
N78-34016
LIBRARY OF CONGRESS, WASHINGTON, D. C.
Initial considerations for a nationwide data base
[ISSN-0160-9742] N78-33983
LINCOLN LAB., MASS. INST. OF TECH., LEXINGTON.
Experimental determination of single and multiple pulse propagation
[AD-A055570] N78-33426
LITTLE [ARTHUR D.], INC., CAMBRIDGE, MASS.
Energy efficiency and electric motors
[HCP/M50217-01] N78-33591
Passing the threshold into the information age: Perspective for federal action on information. Volume 1: Basic findings report
[PB-281720/3] N78-33991
Passing the threshold into the information age: Perspective for federal action on information. Volume 2: Research report
[PB-281721/1] N78-33992
Infrared spectra of lunar soil analogs
[NASA-CR-157742] N78-34020
LOCKHEED-CALIFORNIA CO., BURBANK.
The common case study: Lockheed design of a supersonic cruise vehicle
[NASA-CR-158935] N78-33086
Flaw growth in complex structure. Volume 1: Technical discussion
[AD-A056372] N78-33483
LOCKHEED CORP., BURBANK, CALIF.
Development of graphite/polyimide honeycomb core materials
[NASA-CR-158921] N78-33148
LOCKHEED MISSILES AND SPACE CO., HUNTSVILLE, ALA.
Development of base pressure similarity parameters for application to space shuttle launch vehicle power-on aerodynamic testing
[NASA-CR-150826] N78-33134
LOGICON, INC., LEXINGTON, MASS.
Management information system for ESD program offices
[AD-A056103] N78-33977
LOS ALAMOS SCIENTIFIC LAB., N. MEX.
Sodium vapor heat pipe laser cell
[LA-UR-78-532] N78-33392
Investigation of HEPA filters subjected to tornado pressure pulses: Initial structural testing
[LA-7202-MS] N78-33394
Performance investigations of liquid-metal heat pipes for space and terrestrial applications
[LA-UR-78-547] N78-33396
Fiber-optic time domain reflectometer
[LA-UR-78-824] N78-33415
Wire-scanner reentering experiment error estimates
[LA-6959-MS] N78-33418
Preliminary optimization model for assessment of energy development in the Rocky Mountain region
[LA-6689-MS] N78-33558
Contribution of chemistry to energy
[LA-UR-78-706] N78-33559
Thermal drawdown and recovery of singly and multiply fractured hot dry rock reservoirs
[LA-7219-MS] N78-33572
Solar-thermochemical production of hydrogen from water
[LA-UR-78-1052] N78-33586
Advances in alpha air monitoring instrumentation
[LA-UR-78-1150] N78-33623
Computer simulation of the visual effects of smoke plumes
[LA-UR-78-689] N78-33625
Advances in human internal radiation counting at Los Alamos: Multiple simultaneous in-vivo measurements
[LA-UR-78-1063] N78-33721
Electron transport code theoretical basis
[LA-7227-MS] N78-33900
LOUISIANA STATE UNIV. AND A&M COLL., BATON ROUGE.
Radio frequency size effect measurements on the Fermi surface of rhenium
N78-33962

M

MALLORY [P. R.] AND CO., INC., BURLINGTON, MASS.
Sealed primary lithium-inorganic electrolyte cell
[AD-A056370] N78-33543
MAN-ACOUSTICS AND NOISE, INC., SEATTLE, WASH.
Commercial airport operations and community noise criteria
[AD-A057451] N78-33615
MARTIN MARIETTA AEROSPACE, DENVER, COLO.
Applications of thermal energy storage in the cement industry
[NASA-CR-159399] N78-33537
MARYLAND UNIV., BALTIMORE.
Effects of nitrogen dioxide on pulmonary function in human subjects
[PB-281186/7] N78-33723
MARYLAND UNIV., COLLEGE PARK.
Nearest neighbor spacings of clean vanadium surfaces from extended appearance potential fine structure
[AD-A057142] N78-33202
Extended fine structure above vanadium L-shell appearance potential thresholds
[AD-A057141] N78-33203
Interactive electronic circuit simulation on small computer systems with a real time algorithm for ac analysis
N78-33808
Algorithms and hardware technology for image recognition
[AD-A057191] N78-33821

Equilibrium and nonlocal stability properties of bounded relativistic electron beam-plasma systems
N78-33923
Far infrared cyclotron resonance in semiconducting lead telluride
N78-33950

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Early stages of the oxidation of metal surfaces
[NASA-CR-157767] N78-33195
High temperature properties and processes in ceramics: Thermomigration
[COO-2923-02] N78-33241
Multiple-coupled random access techniques for packet radio networks
[AD-A056550] N78-33298
Studies of impact-induced responses of a generic crushable-rigid rodlike missile against rigid and deformable targets
[ASRL-TR-190-1] N78-33454
A lower bound to protocol information in data networks
[AD-A056345] N78-33812
Adaptive stochastic control of linear systems with random parameters
[AD-A056849] N78-33822
Information theoretic analysis of multiphoton excitation and collisional deactivation in polyatomic molecules
[COO-2793-11] N78-33899

MASSACHUSETTS INST. OF TECH., OAK RIDGE, TENN.
Volume-restricted freezing of living cells and tissues
[ORNL/MIT-265] N78-33705

MASSACHUSETTS UNIV., AMHERST.
Theoretical study of background radiance in upper atmosphere
[AD-A057249] N78-33667

MATHTECH, INC., PRINCETON, N. J.
Network aggregation in transportation planning. Volume 1: Summary and survey
[PB-281384/8] N78-34011
Network aggregation in transportation planning. Volume 2: A fixed point method for treating traffic equilibria
[PB-281385/5] N78-34012

MCDONNELL-DOUGLAS ASTRONAUTICS CO., HUNTINGTON BEACH, CALIF.
Central receiver solar thermal power system. Phase 1. CDRL item 2, pilot plant preliminary design report. Volume 2: System description and system analysis
[SAN-1108-8/1-VOL-2] N78-33571

MCDONNELL-DOUGLAS ASTRONAUTICS CO., ST. LOUIS, MO.
Pioneer Jupiter orbiter probe mission 1980, probe description
[NASA-CR-137591] N78-33127

MEGATEK CORP., SAN DIEGO, CALIF.
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 1: Report proper
[AD-A056702] N78-33077
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 2: Data sheets
[AD-A056629] N78-33078
OMEGA Norway antenna system characteristics: Modification and validation tests. Volume 3: Test plan for base impedance
[AD-A056685] N78-33079
OMEGA Norway antenna system characteristics. Modification and validation tests. Volume 4: Test plan for field intensity measurements
[AD-A056631] N78-33080

MICHIGAN STATE UNIV., EAST LANSING.
High efficiency collision-induced dissociation in an RF-only quadrupole
[AD-A057201] N78-33171
The design and operation of an automated, high-efficiency photoionization mass spectrometer
[AD-A056269] N78-33412
Nitrate and phosphorus runoff losses from small watersheds in Great Lakes Basin
[PB-281275/8] N78-33633
Optimal control system design: The predictive sampling problem
N78-33859

MICHIGAN UNIV., ANN ARBOR.
Streaming birefringence in extensional flow of polymer solutions
N78-33365
Improved ultrasonic nondestructive testing of pressure vessels
[PB-282170/0] N78-33470
The yield locus as a function of temperature for oriented and unoriented polycarbonate and polypropylene
N78-33473
An analysis of the kinetic energy of two extratropical cyclones
N78-33673
Rain scavenging studies
[COO-1407-65] N78-33676
Quantitative organ visualization
N78-33708
A discrete ordinates solution of the time-dependent Fokker-Planck equation
N78-33827
Parity nonconservation in the hydrogen atom
N78-33887
Effect of a nonlinear refractive index on Faraday rotation
N78-33903
Comparative issues and methods in organizational diagnosis. Report 2: The decision tree approach
[AD-A057160] N78-33978

MINNESOTA UNIV., MINNEAPOLIS.
Nuclear magnetic resonance relaxation in aqueous protein systems
N78-33155
A theoretical study on oxidative catalytic monoliths
N78-33158
The morphology and stability of material phases
N78-33364
Optimal regulation of nonlinear systems by methods of tensor algebra
N78-33828
A note on ancillarity and independence via model-preserving transformations
[AD-A056344] N78-33870

MISSION RESEARCH CORP., LA JOLLA, CALIF.
Integrated injection logic [I2L]. Comparative and design trade-off evaluation
[AD-A056392] N78-33342

MISSION RESEARCH CORP., SANTA BARBARA, CALIF.
On the radiation damping of high externally resonant electromagnetic systems
[AD-A056316] N78-33317

MISSISSIPPI UNIV., UNIVERSITY.
Charge condition at the junction of unequal radii wires. Part 2: Current distribution on thick cylindrical structures
[AD-A056894] N78-33307

MISSOURI UNIV. - COLUMBIA.
Buckling of reinforced concrete spherical shells
N78-33472
An investigation into the energy exchange processes within a nonequilibrium 4 MHz RF helium plasma
N78-33927

MISSOURI WATER RESOURCES CENTER, ROLLA.
Measurement of absorption coefficients of water in the visible spectral region, phase 1 and 2
[PB-281500/9] N78-33182

MITRE CORP., BEDFORD, MASS.
AFSATCOM life cycle cost model
[AD-A056102] N78-33131
Geographic data display
[AD-A056101] N78-33514

MITRE CORP., MCLEAN, VA.
Parameters of future ATC systems relating to airport capacity/delay
[AD-A057059] N78-33068
Machine-readable identification system for library materials
[PB-282499/3] N78-33998

MONTANA UNIV., MISSOULA.
A geometrical view of the Kolmogorov-Smirnov statistics with multi-sample generalizations
N78-33855

MOUND LAB., MIAMISBURG, OHIO.
Tritium Systems Test Facility
[MLM-2500] N78-33940

N

NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
Contingency plans for chromium utilization. Publication NMAB-335
[NASA-CR-157789] N78-33207

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C.
Aeronautical engineering: A continuing bibliography with indexes, supplement 100
[NASA-SP-7037[100]] N78-33035
Experimental analysis and computation of the onset and development of the boundary layer transition
[NASA-TM-75325] N78-33041
Measurement of unsteady pressures in rotating systems
[NASA-TM-75445] N78-33042
Second high energy astronomy observatory launch set
[NASA-NEWS-RELEASE-78-165] N78-33130
From space on a parachute
[NASA-TM-75577] N78-33140
The present situation and forecasts of semiconductor elements performance within the microwave range, 1970-1985
[NASA-TM-75453] N78-33338
Optical characteristics of the earth's surface and atmosphere from the point of view of the remote sensing of natural resources: Review of the contemporary status of the problem
[NASA-TM-75548] N78-33642
Tectonic asymmetry of the earth and other planets
[NASA-TM-75576] N78-33643
Relationship between osmotic pressure of the blood and secretion of sweat
[NASA-TM-75461] N78-33703
The preventive role of ultraviolet radiation during exposure to ionizing radiation
[NASA-TM-75106] N78-33710
The lumbosacral segment as a vulnerable region in various postures
[NASA-TM-75579] N78-33713
Optical measurement methods in thermogasdynamics
[NASA-TM-75333] N78-33915
Radiophysical investigations of Venus from spacecraft
[NASA-TM-75578] N78-34017

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Laser-velocimeter surveys of merging vortices in a wind tunnel: Complete data and analysis
[NASA-TM-78449] N78-33043
An approximate solution for the free vibrations of rotating uniform cantilever beams
[NASA-TM-X-62299] N78-33289
Micro-fluid exchange coupling apparatus
[NASA-CASE-ARC-11114-1] N78-33717
Are the stratospheric dust particles meteor ablation debris or interplanetary dust?
[NASA-TM-78507] N78-34014
Meteor ablation spheres from deep-sea sediments
[NASA-TM-78510] N78-34021

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. HUGH L. DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CALIF.
Comparison of concurrent strain gage- and pressure transducer-measured flight loads on a lifting reentry vehicle and correlation with wind tunnel predictions
[NASA-TP-1331] N78-33053
Aerodynamic derivatives for an oblique wing aircraft estimated from flight data by using a maximum likelihood technique
[NASA-TP-1336] N78-33054

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
ATS-6 flight accelerometers
[NASA-TM-79847] N78-33096
Effect of surface roughness on the microwave emission from soils
[NASA-TM-79606] N78-33284
Early results from ISEE-A electric field measurements
[NASA-TM-79633] N78-33339
Anomalous dispersion and the pumping of far infrared [FIR] lasers
[NASA-TM-79596] N78-33424
Discrimination of rock classes and alteration products in southwestern Saudi Arabia with computer-enhanced LANDSAT data
[NASA-TP-1327] N78-33499
Remote sensing of atmospheric water vapor, liquid water and wind speed at the ocean surface by passive microwave techniques from the Nimbus-5 satellite
[NASA-TM-79568] N78-33512
Determining crustal strain rates with a spaceborne geodynamics ranging system. 2: Station coordinate analysis
[NASA-TM-79627] N78-33647
X ray spectra of X Per
[NASA-TM-79646] N78-34013
Observability of the neutrino flux from the inner region of the galactic disk
[NASA-TM-79658] N78-34026
The dynamical halo and the variation of cosmic-ray path length with energy
[NASA-TM-79647] N78-34027

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
Aerodynamic load distributions at transonic speeds for a close-coupled wing-canard configuration: Tabulated pressure data
[NASA-TM-78780] N78-33045
Geometry requirements for unsteady aerodynamics in aeroelastic analysis and design
[NASA-TM-78781] N78-33046
Effects of wing leading-edge deflection on the low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration
[NASA-TM-78787] N78-33047
Subsonic dynamic stability characteristics of two close-coupled canard-wing configurations
[NASA-TP-1291] N78-33050
Estimation of leading-edge thrust for supersonic wings of arbitrary planform
[NASA-TP-1270] N78-33051
Prospects for a civil/military transport aircraft
[NASA-TM-78724] N78-33060
Characteristics of future air cargo demand and impact on aircraft development: A report on the Cargo/Logistic Airlift Systems Study [CLASS] project
[NASA-TM-78774] N78-33061
Static pressure orifice system testing and apparatus
[NASA-CASE-LAR-12269-1] N78-33123

Nitric oxide production in the stratosphere within the Space Shuttle's solid rocket motor plumes
[NASA-TP-1365] N78-33135
Impact tests on fibrous composite sandwich structures
[NASA-TM-78719] N78-33152
An evaluation of the sandwich beam in four-point bending as a compressive test method for composites
[NASA-TM-78783] N78-33153
Effect of silicon carbide on devitrification of a glass coating for reusable surface insulation
[NASA-TM-78755] N78-33230
Direct measurements and analysis of skin friction and cooling downstream of multiple flush-slot injection into a turbulent Mach 6 boundary layer
[NASA-TP-1176] N78-33385
Dust adhesion on Viking lander camera window
[NASA-TM-78782] N78-33407
Telescoping columns
[NASA-CASE-LAR-12195-1] N78-33446
Structural efficiency of long lightly loaded truss and isogrid columns for space applications
[NASA-TM-78687] N78-33480
Radar target remotely sensing hydrological phenomena
[NASA-CASE-LAR-12344-1] N78-33511
Nuclear electric power sources
[NASA-TM-78789] N78-33538
Laboratory and field measurements of upwelled radiance and reflectance spectra of suspended James River sediments near Hopewell, Virginia
[NASA-TP-1292] N78-33616
Quantitative mapping by remote sensing of an ocean acid-waste dump
[NASA-TP-1275] N78-33617
Adaptation of time line analysis program to single pilot instrument flight research
[NASA-TM-78748] N78-33731
Engineering and Scientific Data Management
[NASA-CP-2055] N78-33776
Guide to a condensed form of NASTR
[NASA-RP-1019] N78-33791
Comparison of low-frequency noise levels of the Concorde supersonic transport with other commercial service airplanes
[NASA-TM-78736] N78-33873
Noise-induced building vibrations caused by concorde and conventional aircraft operations at Dulles and Kennedy International Airports
[NASA-TM-78769] N78-33874
Impedance measurement using a two-microphone, random-excitation method
[NASA-TM-78785] N78-33875

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.

Redundant disc
[NASA-CASE-LEW-12496-1] N78-33101
Results and status of the NASA aircraft engine emission reduction technology programs
[NASA-TM-79009] N78-33102
Performance of a transonic fan stage designed for a low meridional velocity ratio
[NASA-TP-1298] N78-33107
Design and overall performance of four highly loaded, high speed inlet stages for an advanced high-pressure-ratio core compressor
[NASA-TP-1337] N78-33108
Design and performance of a 427-meter-per-second-tip-speed two-stage fan having a 2.40 pressure ratio
[NASA-TP-1314] N78-33109
DYGABCD: A program for calculating linear A, B, C, and D matrices from a nonlinear dynamic engine simulation
[NASA-TP-1295] N78-33110
Thermal characteristics of the 12-gigahertz, 200-watt output stage tube for the communications technology satellite
[NASA-TP-1344] N78-33137
Analysis/design of strip reinforced random composites [strip hybrids]
[NASA-TM-78985] N78-33149
Acoustic emission testing of composite vessels under sustained loading
[NASA-TM-78981] N78-33150
Ion beam sputtering of fluoropolymers
[NASA-TM-79000] N78-33151
Long-term hot-hardness characteristics of five through-hardened bearing steels
[NASA-TP-1341] N78-33196
An airborne meteorological data collection system using satellite relay [ASDAR]
[NASA-TM-78992] N78-33283
Engineering in the 21st century
[NASA-TM-79010] N78-33380
The practical impact of elastohydrodynamic lubrication
[NASA-TM-78987] N78-33445
Minimum film thickness in elliptical contacts for different regimes of fluid-film lubrication
[NASA-TP-1342] N78-33447
Aerial thermography for energy conservation
[NASA-TM-78959] N78-33510
Ozone concentration in the cabin of a Gates Learjet measured simultaneously with atmospheric ozone concentrations
[NASA-TP-1340] N78-33618

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.

Coal desulfurization
[NASA-CASE-NPO-14272-1] N78-33164
Thermoplastic rubber comprising ethylene-vinyl acetate copolymer, asphalt and fluxing oil
[NASA-CASE-NPO-88351] N78-33228
Hydrogen-fueled engine
[NASA-CASE-NPO-13763-1] N78-33526
Optical probe
[NASA-CASE-NPO-14247-1] N78-33715
Plural output optimetric sample cell and analysis system
[NASA-CASE-NPO-10233-1] N78-33913

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. WALLOPS STATION, WALLOPS ISLAND, VA.

GEOS-3 ocean current investigation using radar altimeter profiling
[NASA-TM-73280] N78-33696

NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER, ATLANTIC CITY, N. J.

The analysis of National Transportation Safety Board small multiengine fixed-wing aircraft accident/incident reports for the potential presence of low-level wind shear
[AD-A056780] N78-33063
Vortex advisory system simulation of Chicago O'Hare Airport
[AD-A057112] N78-33069
TRSB microwave landing system demonstration program at Shiraz, Iran
[AD-A055526] N78-33071
Digitized radar data compressor
[AD-A057442] N78-33290
Terminal radar interference criteria study
[AD-A057280] N78-33291
Two lightning-flash counter systems
[AD-A057369] N78-33655

NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.

Materials studies for magnetic fusion energy applications at low temperatures, I
[PB-282444/9] N78-33225
Publication and services of the Cryogenics Division, National Bureau of Standards, 1953 - 1977
[PB-281465/5] N78-33276
Laser far-field beam-profile measurements by the focal plane technique
[PB-281542/1] N78-33438

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D. C.

Journal of Research of the National Bureau of Standards. Volume 83, No. 1, January - February 1978
[PB -281311/1] N78-33274
Measurement techniques for high power semiconductor materials and devices
[PB-281723/7] N78-33360
Hydraulic research in the United States and Canada
[PB-281501/7] N78-33400
Survey of the occurrence of mercury, lead, and cadmium in the Washington, D. C. area
[PB-281725/2] N78-33629
A cost benefit analysis of proposed Federal input/output channel level computer interface standards
[PB-282406/8] N78-33761
Computer science and technology: The design and implementation of the National Bureau of Standards' Network Access Machine [NAM]
[PB-282510/7] N78-33762
Science on its way to work: Activities of the National Bureau of Standards
[PB-282044/7] N78-34000

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.

Energetics diagnosis of the NCAR general circulation model
[PB-281140/4] N78-33685
Management of atmospheric data N78-33782

NATIONAL ENVIRONMENTAL SATELLITE SERVICE, WASHINGTON, D. C.

In-orbit storage of NOAA-NESS standby satellites
[PB-283078/4] N78-33133

NATIONAL GEODETIC SURVEY, ROCKVILLE, MD.

TRAV10 horizontal network adjustment program
[PB-283087/5] N78-33668

NATIONAL HURRICANE AND EXPERIMENTAL METEOROLOGY LAB., CORAL GABLES, FLA.

Low-layer features of two limited-area hurricane regimes
[PB-283079/2] N78-33690

NATIONAL INST. OF MENTAL HEALTH, BETHESDA, MD.

Project RMAG: Symbolic logic retrieval source code
[PB-281373/1] N78-33979
Project RMAG: Symbolic logic retrieval users guide
[PB-281374/9] N78-33980

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.

Flight data of electric field thunderstorm research international project, trip 76, July 1976
[NASA-CR-15779] N78-33693
Kinetic transport properties of a bumpy torus with finite radial ambipolar field
[ORNL/TM-6215] N78-33942

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C.

National hurricane operations plan
[PB-282838/2] N78-33689

NATIONAL PHYSICAL RESEARCH LAB., PRETORIA [SOUTH AFRICA].

A Nimbus G pre-launch field experiment in the Gulf of Mexico, October 1977
[NASA-CR-157786] N78-33509

NATIONAL SEVERE STORMS LAB., NORMAN, OKLA.

National Severe Storms Laboratory: History and FY 1976 program
[PB-282665/9] N78-33688

NATIONAL STANDARD REFERENCE DATA SYSTEM.

Atomic energy levels: The rare earth elements [the spectra of lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, ebrium, thulium, ytterbium, and lutetium]
[PB-282067/8] N78-33901

NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VA.

Bird strikes and aviation safety. A bibliography with abstracts
[NTIS/PS-78/0694/6] N78-33066
Closed loop control systems. Part 1: Aircraft. A bibliography with abstracts
[NTIS/PS-78/0809/0] N78-33122
X ray fluorescence analysis, volume 2. A bibliography with abstracts
[NTIS/PS-78/0722/5] N78-33185
Polycarboranes. A bibliography with abstracts
[NTIS/PS-78/0865/2] N78-33246
Polycarbonates: Properties, synthesis, and applications. A bibliography with abstracts
[NTIS/PS-78/0754/8] N78-33247
Alcohol fuels. Citations from the NTIS data base
[NTIS/PS-78/0673/0] N78-33262
Alcohol fuels. Citations from the engineering index data base
[NTIS/PS-78/0674/8] N78-33263
Electropolishing. Citations from the engineering index data base
[NTIS/PS-78/0712] N78-33275
Closed loop control systems. Part 2: Miscellaneous applications. A bibliography with abstracts
[NTIS/PS-78/0810/8] N78-33278
Tropospheric scatter communications. A bibliography with abstracts
[NTIS/PS-78/0718/3] N78-33322
Computer aided design of microcircuits. Citations from the engineering data base
[NTIS/PS-78/0822/5] N78-33361
Light emitting diodes, volume 2. A bibliography with abstracts
[NTIS/PS-78/0736/5] N78-33362
Ferrite microwave electronics, volume 3. A bibliography with abstracts
[NTIS/PS-78/0738/1] N78-33363
Drag reducing fluids. A bibliography with abstracts
[NTIS/PS-78/0730/8] N78-33402
Numerical methods in fluid flow problems, volume 3. A bibliography with abstracts
[NTIS/PS-78/0823/1] N78-33403
Numerical methods in fluid flow problems, volume 4. A bibliography with abstracts
[NTIS/PS-78/0824/9] N78-33404
Dye laser, volume 2. A bibliography with abstracts
[NTIS/PS-78/0872/8] N78-33439
Carbon dioxide lasers, volume 3. A bibliography with abstracts
[NTIS/PS-78/0896/7] N78-33440
Neodymium YAG lasers. A bibliography with abstracts
[NTIS/PS-78/0808/2] N78-33441
Inert gas welding, volume 2. Citations from the engineering index data base
[NTIS/PS-78/0904-VOL-2] N78-33460
Inert gas welding, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0905/6] N78-33461
Inert gas welding. Citations from the NTIS data base
[NTIS/PS-78/0903/1] N78-33462
Mathematical analysis of stress cracks, volume 1. A bibliography with abstracts
[NTIS/PS-78/0768/8] N78-33498
Remote sensing applied to hydrology. A bibliography with abstracts
[NTIS/PS-78/0792/8] N78-33523
Fuel consumption: Transportation, volume 1. A bibliography with abstracts
[NTIS/PS-78/0707/6] N78-33599

Fuel consumption: Transportation, volume 2. A bibliography with abstracts
[NTIS/PS-78/0708/4] N78-33600
Fuel consumption: Industrial, residential, and general studies. Volume 1. A bibliography with abstracts
[NTIS/PS-78/0709/2] N78-33601
Fuel consumption: Industrial, residential, and general studies. Volume 2. A bibliography with abstracts
[NTIS/PS-78/0710/0] N78-33602
Lithium batteries, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0660/7] N78-33603
Lithium batteries. Citations from the engineering index data base
[NTIS/PS-78/0661/5] N78-33604
Lead batteries. Citations from the NTIS data base
[NTIS/PS-78/0689/6] N78-33605
Lead batteries. Citations from the engineering index data base
[NTIS/PS-78/0690/4] N78-33606
Heliostat systems design and operation. Citations from the engineering index data base
[NTIS/PS-78/0842/1] N78-33608
Solar energy concentrator design and operation. Citations from the engineering index data base
[NTIS/PS-78/0839/7] N78-33609
Flat plate solar collector design and performance. Citations from the engineering index data base
[NTIS/PS-78/0841/3] N78-33610
Urban noise pollution. A bibliography with abstracts
[NTIS/PS-78/0686/2] N78-33634
Airport noise. A bibliography with abstracts
[NTIS/PS-78/0807/4] N78-33639
Fog prediction. A bibliography with abstracts
[NTIS/PS-78/0775/3] N78-33694
Gulf Stream. A bibliography with abstracts
[NTIS/PS-78/0844/7] N78-33700
Cryobiology. A bibliography with abstracts
[NTIS/PS-78/0678/9] N78-33707
Hyperbaric oxygenation. A bibliography with abstracts
[NTIS/PS-78/0676/3] N78-33724
Anthropometry: Basic studies and applications, volume 2. A bibliography with abstracts
[NTIS/PS-78/0866/0] N78-33726
Computer information security and protection, volume 1. Citations from the NTIS data base
[NTIS/PS-78/0859/5] N78-33763
Computer information security and protection, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0860/3] N78-33764
Computer information security and protection. Citations from the engineering index data base
[NTIS/PS-78/0861/1] N78-33765
Structured programming. A bibliography with abstracts
[NTIS/PS-78/0688/8] N78-33806
Geothermal energy. Part 1: Exploration, volume 3. Citations from NTIS data base
[NTIS/PS-78/0664/9] N78-33881
Geothermal energy. Part 2: Corrosion and equipment, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0665/6] N78-33882
Geothermal energy. Part 3: Technology and general studies, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0666/4] N78-33883
Geothermal energy, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0667/2] N78-33884
Acoustic holography. Citations from the NTIS data base
[NTIS/PS-78/0700/1] N78-33885
Acoustic holography. Citations from the engineering index data base
[NTIS/PS-78/0701/9] N78-33886
Fiber optics, volume 2. Citations from the NTIS data base
[NTIS/PS-78/0713/4] N78-33918
Fiber optics, volume 3. Citations from the NTIS data base
[NTIS/PS-78/0714/2] N78-33919
Fiber optics, volume 2. Citations from the engineering index data base
[NTIS/PS-78/0715/9] N78-33920
Fiber optics, volume 3. Citations from the engineering index data base
[NTIS/PS-78/0716/7] N78-33921
Infrared upconversion. A bibliography with abstracts
[NTIS/PS-78/0670/6] N78-33922
Liquid crystals. A bibliography with abstracts
[NTIS/PS-78/0767/0] N78-33974

NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
Annual review of aircraft accident data, US general aviation, calendar year 1976
[PB-281330/1] N78-33064
Annual review of aircraft accident data, US air carrier operations, 1976
[PB-281329/3] N78-33065

NATIONAL WEATHER SERVICE, HONOLULU, HAWAII.
An operational message composition system using the NWS Automatic Data Acquisition System [ADAS] computer system
[PB-283088/3] N78-33691

NATIONAL WEATHER SERVICE, SILVER SPRING, MD.
Gulfstream: Monthly publications, January - December 1977. Volume 3, nos. 1 - 12
[PB-283177/4] N78-33698

NAVAL AEROSPACE MEDICAL RESEARCH LAB., PENSACOLA, FLA.
Human factors engineering for head-up displays: A review of military specifications and recommendations for research
[AD-A056944] N78-33099

NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.
Galvanic corrosion fatigue testing of 7075-T6 aluminum bonded with graphite-epoxy composite
[AD-A055714] N78-33197
A pollution abatement concept, reclamation of Naval Air Rework Facilities waste solvent, phase 1
[AD-A055469] N78-33619

NAVAL ENVIRONMENTAL PREDICTION RESEARCH FACILITY, MONTEREY, CALIF.
Application of an array processor in satellite image processing
[AD-A056664] N78-33755

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
A study of alternatives for VSTOL computer systems
[AD-A056105] N78-33098
Stress analysis of ceramic turbine blades by finite element method, part I
[AD-A056310] N78-33111
An investigation of the possible uses of the normal mode helical antenna in the tactical army
[AD-A056324] N78-33314
The design and implementation of Instructional Software Information System [ISIS]
[AD-A056323] N78-33984

NAVAL RESEARCH LAB., WASHINGTON, D. C.
Evaluation of a triaxial SQUID magnetometer designed for use as an ELF magnetic antenna
[AD-A056361] N78-33293
Some formal effects of nonlinearities in optimal perturbation control
N78-33820
An efficient direct solver for separable and non-separable elliptic equations
[AD-A056360] N78-33835
Report of progress in the development of an electron impact ionization model
[AD-A056363] N78-33907
Time dependent electron and ion flow in pinched beam diodes
[AD-A056362] N78-33908

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.
Engineering data management: Experience and projections
N78-33787

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, BETHESDA, MD.
Assessment of load alleviation devices installed on a power-augmented-ram wing over irregular waves
[AD-A045425] N78-33049

NAVAL SURFACE WEAPONS CENTER, DAHLGREN, VA.
Nonlinear rolling motion analysis of a Canard-controlled missile configuration at angles of attack from 0 to 30 degrees in incompressible flow
[AD-A056695] N78-33132

NAVAL SURFACE WEAPONS CENTER, WHITE OAK, MD.
Feasibility of ultrasonic Rayleigh waves for the detection of corrosion beneath paint
[AD-A056643] N78-33199
Explosion effects and properties. Part 2: Explosion effects in water
[AD-A056694] N78-33254
Fast reactions of aluminum: A literature review
[AD-A057215] N78-33433
Lithium-boron alloy anodes for molten salt batteries [2]
[AD-A057258] N78-33544

NAVAL UNDERWATER SYSTEMS CENTER, NEW LONDON, CONN.
Reference bibliography on operating system design issues for distributed systems [first release]
[AD-A056560] N78-33813

NAVAL WEAPONS SUPPORT CENTER, CRANE, IND.
Cycle life test
[NASA-CR-156846] N78-33539

NEVADA UNIV. SYSTEM, RENO.
An assessment of synoptic criteria for ice multiplication in convective clouds
[PB-281079/4] N78-33684

NEW HAMPSHIRE UNIV., DURHAM.
Acoustic identification of marine sediments by stochastic methods
N78-33695

NEW JERSEY INST. OF TECHNOLOGY, NEWARK.
Axisymmetric air jet impinging on a hemispherical concave plate
N78-33039
Deposition of suspensions in laminar flow in the entrance region of channels with diffusive, electrostatic and gravitational effects
N78-33369

NEW MEXICO STATE UNIV., LAS CRUCES.
Research and development of antennas for rockets and satellites
[AD-A056710] N78-33349

NEW YORK UNIV., N. Y.
An experimental simultaneous multiprocessor organization
N78-33748

NIELSEN ENGINEERING AND RESEARCH, INC., MOUNTAIN VIEW, CALIF.
Propagation of sound through a sheared flow
[NASA-CR-152196] N78-33876

NORTH AMERICAN WEATHER CONSULTANTS, GOLETA, CALIF.
Initial development of a tactical system for dispersing supercooled stratus
[AD-A056570] N78-33677

NORTH CAROLINA STATE UNIV. AT RALEIGH
An investigation of phase change problems: A: Melting of a semi-transparent medium including radiation effects; B: Transient freezing of turbulent flow inside tubes
N78-33368

NORTH CAROLINA STATE UNIV., RALEIGH.
Digroup data reduction system
[AD-A056986] N78-33304
Optimal joining policies for a queuing system having parallel channels
N78-33817

NORTHEASTERN UNIV., BOSTON, MASS.
A digital control unit for a rocket borne quadrupole mass spectrometer
[AD-A057251] N78-33141

NORTHROP CORP., HAWTHORNE, CALIF.
Prediction, evaluation, and specification of closed loop and multiaxis flying qualities
[AD-A056983] N78-33736

NORTHRUP, INC., HUTCHINS, TEX.
Development and fabrication of a concentrating solar collector subsystem
[NASA-CR-150787] N78-33529

NORTHWESTERN UNIV., EVANSTON, ILL.
Influence of dispersed refractory oxides in retarding catalyst sintering
[EPRI-EM-624] N78-33214
Test particle correlation by a whistler wave in a nonuniform magnetic field
[AD-A057065] N78-33302
Geometrical problems with a position sensitive detector employed on a diffractometer, including its use in the measurement of stress
[AD-A056662] N78-33486

NOTRE DAME UNIV., IND.
Pore shrinkage and Ostwald ripening in metallic systems
[COO-4385-2] N78-33222

O

OAK RIDGE GASEOUS DIFFUSION PLANT, TENN.
Electrodeposition of nickel onto steel using a soluble mobile anode
[K-1894] N78-33220

OAK RIDGE NATIONAL LAB., TENN.
Thermodynamics of carbon in nickel-based multicomponent solid solutions
[ORNL/TM-6282] N78-33206
Heavy-section steel technology program
[ORNL/NUREG/TM-166] N78-33208
Formation of iron carbonyl between a 1/2% Mo steel and high-pressure gases containing carbon monoxide
[ORNL-5410] N78-33215
Study of the effects of several variables on the thermal conductivity of 2 1/4 Cr-1 Mo steel
[ORNL-5313] N78-33219
Room-temperature inelastic test of a nozzle-to-spherical-shell model subjected to pressure and moment loading
[ORNL/TM-6170] N78-33490
Commercial demand for energy: A disaggregated approach
[ORNL/CON-15] N78-33570
Flaw location and characterization in anisotropic materials by ultrasonic spectral analysis
[CONF-780427-1] N78-33880
Overview: History and perspective of the search for superheavy elements
[CONF-780333-2] N78-33898
Finite beta toroidal plasmas
[ORNL/TM-6273] N78-33938

Review of instability theory for high pressure Tokamak plasma
[ORNL/TR-4610] N78-33939
OAK RIDGE Y-12 PLANT, TENN.
LASL laser mirror program: Excerpts from 1/-12 Development Division
[Y-DA-7591] N78-33436
Lightweight laser mirror structural studies
[Y-DA-7472] N78-33437
Computer automation on an electron-beam welder with automatic, stored seam tracking
[Y-2114] N78-33452
Laser-error-correction control unit for machine tools
[Y-2129] N78-33453
OCEAN DATA SYSTEMS, INC., MONTEREY, CALIF.
OTEC thermal resource report for Hawaii
[TID-27950] N78-33573
OTEC thermal resource report for Puerto Rico
[TID-27953] N78-33593
OFFICE OF AIR FORCE HISTORY, WASHINGTON, D. C.
Encyclopedia of US Air Force aircraft and missile systems. Volume 1: Post-World War II fighters 1945 - 1973
[AD-A057002] N78-33036
OFFICE OF TELECOMMUNICATIONS, BOULDER, COLO.
Relations between bit and block error probabilities under Markov dependence
[PB-281545/4] N78-33995
OHIO STATE UNIV., COLUMBUS.
Near field pattern computations for airborne antennas
[AD-A057244] N78-33311
Simulation studies of the database computer [DBC]
[AD-A056048] N78-33753
OHIO UNIV., ATHENS.
The effort of noise exposure on the masking level difference
N78-33709
A mathematical structure
N78-33824
OKLAHOMA UNIV., NORMAN.
A photographic technique to obtain droplet and flow pattern data in two-phase flow for use in modeling
N78-33371
Dynamical model of gust front
[PB-283425/7] N78-33692
An interactive system for the generation of standardized autopsy protocols
N78-33773
OREGON STATE UNIV., CORVALLIS.
A study of the effect of the rotor coil couplings of a synchronous machine on its predicted transient response
N78-33330
Relationships of clay mineralogy to landscape stability in Western Oregon
N78-33500
Functional expansions in bilinear system analysis
N78-33831
OWENS-ILLINOIS, INC., TOLEDO, OHIO.
Installation package for Sunpak solar collectors
[NASA-CR-150802] N78-33528

P

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LAB., CORVALLIS, ORE.
Techniques for sampling and analyzing the marine macrobenthos
[PB-281631/2] N78-33697
PACIFIC-SIERRA RESEARCH CORP., SANTA MONICA, CALIF.
ELF propagation in a non-stratified earth-ionosphere waveguide
[AD-A056143] N78-33295
Analysis of electron density-profiles in the lower ionosphere
[AD-A057254] N78-33665
PENNSYLVANIA STATE UNIV., STATE COLLEGE.
An approximate method for calculating the mean streamlines of the direct problem of an open rotor
[AD-A057151] N78-33388
PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Hydridocyclophosphazenes: Synthesis via organocopper reagents
[AD-A056094] N78-33168
The calibration and application of five-hole probes
[NASA-CR-157735] N78-33387
Construction quality control systems: A comparative analysis
[AD-A056334] N78-33467
A study of the Tyrone-Mount Union lineament by remote sensing techniques and field methods
[E78-10155] N78-33505
High-temperature linear radiation-cavity solar collector with a Fresnel concentrator
N78-33524
Environmental noise: The effects of information overload and control over the work environment on performance during and after exposure
N78-33612
Piezo-optic properties of liquids under high pressure
[AD-A055448] N78-33969
PENNSYLVANIA UNIV., PHILADELPHIA.
High temperature cyclic deformation in nickel TD-nickel, and Al-4 percent Cu alloy aged to contain theta prime and theta double prime
N78-33190
Radar processing with baseband hard limiting
N78-33281
Planning telecommunications systems: A normative approach
N78-33866
Magnetic properties of two dilute spin systems
N78-33957
Experimental and theoretical study of the surface states/surface resonances on the {100} faces of group VIP transition metals
N78-33964
Cooperative research and development and associated government policy
N78-33976
PERCEPTRONICS, INC., WOODLAND HILLS, CALIF.
Application of adaptive decision aiding systems to computer assisted instruction: Adaptive Computerized Training System [ACTS]
[AD-A056900] N78-33797
PITTSBURGH UNIV., PA.
The ionization of uranium atoms by electron impact
N78-33894
POLYTECHNIC INST. OF NEW YORK.
A study on thermoplastic structural foam
N78-33229
Forced flow laminar filmwise condensation of a pure saturated vapor in a vertical tube
N78-33367
Change in reflectivity of a metal surface during intense laser irradiation
N78-33420
High frequency behavior of source excited concave surfaces
N78-33475
Bayesian reliability analysis of the alpha distributions with applications
N78-33847
Multi-objective analysis applied to areawide wastewater management
N78-34005
Escape of gases from planetary atmospheres
N78-34018
POLYTECHNIC INST. OF NEW YORK, FARMINGDALE.
An old integration scheme for compressible flows revisited, refurbished and put to work
[NASA-CR-15775] N78-33382
PORTLAND CEMENT ASSOCIATION, SKOKIE, ILL.
Applications of thermal energy storage in the cement industry
[NASA-CR-159399] N78-33537
PORTLAND STATE UNIV., OREG.
The statistical manipulation of delphi statements
N78-34003
PRATT AND WHITNEY AIRCRAFT, EAST HARTFORD, CONN.
CAD/CAM data management needs, requirements and options
N78-33778
PRINCETON UNIV., N. J.
Oblique shock wave/turbulent boundary layer interactions in three dimensions at Mach 3, part 2
[AD-A057010] N78-33056
Tokamak confinement
[PPPL-1442] N78-33945
PROTOTYPE DEVELOPMENT ASSOCIATES, INC., SANTA ANA, CALIF.
Hardened reentry vehicle development program. Erosion-resistant nosetip technology
[AD-A056390] N78-33128
PURDUE UNIV., LAFAYETTE, IND.
Microprobe method for studying gas-liquid oxygen transfer in various surfactant systems
N78-33160
Performance evaluation of simple HF antenna systems
[AD-A057255] N78-33310
Analysis of a high speed ring valve system for a single cylinder reciprocating compressor
N78-33442

R

R AND D ASSOCIATES, MARINA DEL REY, CALIF.
Evaluation of geothermal energy exploration and resource assessment, volume 1: A review of geothermal subsidence modeling
[SAN-1269-1-VOL-1] N78-33515
RAND CORP., SANTA MONICA, CALIF.
The feasibility of employing frequencies between 20 and 300 GHz for earth-statellite communications links
[AD-A056100] N78-33300
RAYTHEON CO., WALTHAM, MASS.
Surface acoustic wave stabilized oscillators: Additional aging results
[NASA-CR-156833] N78-33340
Cost effective GaAs Read IMPATT transmitters
[AD-A056996] N78-33352
RCA LABS., PRINCETON, N. J.
Charge-coupled scanned IR imaging sensors
[AD-A057115] N78-33916
RENSSELAER POLYTECHNIC INST., TROY, N. Y.
Localized corrosion and stress corrosion cracking behavior of austenitic stainless steel weldments containing retained ferrite
[COO-2462-4] N78-33213
Mathematical analysis of effects of underwater sound-source motion on received total acoustic field
N78-33872
Growth and characterization of semi-insulating GaN thin films
N78-33954
RESEARCH TRIANGLE INST., RESEARCH TRIANGLE PARK, N. C.
Symposium proceedings: Environmental aspects of fuel conversion technology, 3
[PB-282429/0] N78-33636
RESOURCE PLANNING ASSOCIATES, INC., CAMBRIDGE, MASS.
Potential for cogeneration development in six major industries by 1985
[HCP/M60172-01/2] N78-33551
RESOURCE PLANNING ASSOCIATES, INC., WASHINGTON, D. C.
Institutional applications of solar total energy systems
[ALO-3786-2] N78-33569
RICE UNIV., HOUSTON, TEX.
A model calculation for the interaction of hydrogen with transition metals: H in Ni
N78-33193
Electron beam pumped vapor phase dye lasers
N78-33423
Geology of the northern Sierra Nevada basement rocks, Quincy-Downieville area, California
N78-33640
Study of a class of parallel programs
N78-33772
Hardware scheduling strategies for systems with many processors
N78-33810
A methodology for nonlinear feature extraction in statistical pattern recognition
N78-33819
An extension of Newton's method to systems of equations and inequalities
N78-33832
An adaptive orthogonal-series estimator for probability density functions
N78-33849
Experimental study of resonant electron transfer in He [+] [+] He and H [+] [+]H collisions at low relative velocities
N78-33888
Interactions of atoms with solid surface: Nonadiabatic mechanism for the production of excited state hydrogen and helium atoms at a metal surface
N78-33889
Two problems involving imperfect conductivity in a collisionless plasma
N78-33929
Electron-spin polarization in low energy electron diffraction from tungsten {001}
N78-33960
AB initio LCAO/MO cluster-type calculation of the self consistent electronic screening charge density around a single hydrogen impurity in a nickel crystal
N78-33963
ROCHESTER UNIV., N. Y.
Investigations of the coherence properties of a ring laser
N78-33421
X-ray analysis of biological specimens
[UR-3490-1341] N78-33704
Dissemination of the PADL-1.0/n processor: Part and Assembly Description Language [PADL]
[PB-281549/6] N78-33757
The PADL-1.0/n processor: Overview and system documentation
[PB-281550/4] N78-33758
Representations in the PADL-1.0/n processor: Simple geometric entities
[PB-281551/2] N78-33759
Representations in the PADL-1.0/n processor: Boundary representations and the BFILE/1 system
[PB-281552/0] N78-33760
Sequential least squares estimation of slowly time-varying parameters
N78-33834
Constructive solid geometry
[PB-281613/0] N78-33842
A study of geometric set-membership classification
[PB-281573/6] N78-33843

Mathematical models of rigid solid objects
[PB-281535/5] N78-33844
A study of two-armed bandits
N78-33857
The multi-product production cycling problem
N78-33864
Hierarchical analysis of systems
N78-33865
Investigations of resonance fluorescence
N78-33892
Spatially, and temporally resolved harmonic emission studies of laser produced plasmas
N78-33928
Brillouin scattering from tungsten bronze materials
N78-33955
Impression creep of LiF and Cu-Ni single crystals
N78-33956
A model dielectric function for silicon
N78-33959

ROCKWELL INTERNATIONAL CORP., DOWNEY, CALIF.
Development of a cryogenic rotating heat pipe joint
[NASA-CR-152188] N78-33384

ROCKWELL INTERNATIONAL CORP., THOUSAND OAKS, CALIF.
Microstructurally developed toughening mechanisms in ceramics. Stress-induced martensitic reactions. 1: Theory of metastable phase retention and contribution to fracture toughness
[AD-A057239] N78-33231
Microstructurally developed toughening mechanisms in ceramics. Stress induced martensitic reaction. 2: Experiments in the ZRO2-Y2-O3 system
[AD-A057240] N78-33232
Microstructurally developed toughening mechanisms in ceramics. Fracture toughness of Si3N4 as a function of the initial alpha-phase content
[AD-A057241] N78-33233
Microstructurally developed toughening mechanisms in ceramics. Compressive surface stresses developed in ceramics by an oxidation-induced phase change
[AD-A057242] N78-33234

ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCES, MIAMI, FLA.
Photoproduction of hydrogen by marine blue-green algae
[PB-280995/2] N78-33264

ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, KJELLER.
Statistical models for seismic magnitude
[AD-A056140] N78-33658

S

SACLANT ASW RESEARCH CENTER, LA SPEZIA (ITALY).
Revised simplified formulae for calculating the speed of sound in sea water
[AD-A056556] N78-33877

SAINT LOUIS UNIV., MO.
An investigation of the boundary layer of an axisymmetric mesoscale vortex
[PB-282507/3] N78-33687

SAN FRANCISCO UNIV., CALIF.
Micro-fluid exchange coupling apparatus
[NASA-CASE-ARC-11114-1] N78-33717

SANDIA LABS., ALBUQUERQUE, N. MEX.
Continuous Kalman updating of an inertial navigation system using terrain measurements
[SAND-78-0421C] N78-33083
Hybrid computer study of the sensitivity of aircraft dynamics to aerodynamic cross-coupling
[SAND-77-1309C] N78-33121
Metal deformation modeling: Stress relaxation of aluminum
[SAND-78-0164C] N78-33209
Surface cleaning in thin film technology
[SAND-77-1716C] N78-33269
Thermal degradation and termination behavior of thick film resistors
[SAND-77-1904] N78-33355
Flexible system having two selectable ratios for use with Josephson voltage devices with 2 selectable ratios
[SAND-77-2121C] N78-33356
Measurements of dimensional and electrical characteristics of printed boards made with IPC Multi-Purpose Test Pattern, B-25
[SAND-77-1837C] N78-33357
NACHOS: A finite element computer program for incompressible flow problems. Part 1: Theoretical background
[SAND-77-1333-PT-1] N78-33395
Active devices for high temperature microcircuitry
[SAND-77-1145] N78-33414
Multiple cavity laser holographic system
[SAND-78-0496] N78-33417
Lagrangian finite-difference calculations of an explosion in a partially water-filled rigid cylindrical tank
[SAND-77-1394] N78-33488
Technique for measurements of plane waves of uniaxial strain
[SAND-77-0199C] N78-33494
Physically-based internal variable model for rate-dependent plasticity
[SAND-78-0181C] N78-33495
Solar total-energy large-scale experiment at Shenandoah, Georgia
[SAND-77-2075C] N78-33561
Torque ripple in a vertical axis wind turbine
[SAND-78-0577] N78-33596
Techniques for digital data transformation and monitoring
[SAND-77-1604C] N78-33800
NOS operating system base for Sandia's scientific computer network
[SAND-78-0132] N78-33815
SALOGS digital logic simulator
[SAND-78-0390C] N78-33816
High-speed lookup table technique for digital multiplication
[SAND-77-1866] N78-33840
Shifted incomplete Cholesky factorization
[SAND-78-8226] N78-33841
Optical and physical properties of evaporated PbS film
[SAND-79-0300] N78-33973

SANDIA LABS., LIVERMORE, CALIF.
Data acquisition systems applied to printed-wiring-board measurements
[SAND-78-8501] N78-33358

SCIENCE APPLICATIONS, INC., ANN ARBOR, MICH.
An investigation of the gaseous character of the atmosphere at the high energy laser test facility HELSTF at the White Sands Missile range [WSMR]
[AD-A056378] N78-33429

SCIENCE APPLICATIONS, INC., BOULDER, COLO.
Nonlinear Landau damping in mirror plasmas
[SAI-78-529-LJ] N78-33941

SCORE, INC., CAMBRIDGE, MASS.
The 1976 energy resource alternatives II competition
[COO-2698-2] N78-33595

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.
Climate forecast verification via multinomial stochasters
[AD-A056920] N78-33681
Annual and seasonal maps of the residual temperature in the upper waters of the western North Pacific from 1954 - 1974
[PB-281212/1] N78-33699

SCRIPPS INSTITUTION OF OCEANOGRAPHY, SAN DIEGO, CALIF.
Airborne measurements of atmospheric volume scattering coefficients in northern Europe, fall 1976
[AD-A057144] N78-33660

SDC/INTEGRATED SERVICES, INC., RESEARCH TRIANGLE PARK, N. C.
National Computer Center personnel management information system design requirements specification. Volume 1: Design requirements and data dictionary
[PB-282589/1] N78-33981
National Computer Center personnel management information system design requirements specification. Volume 2: Report index and formats
[PB-282590/9] N78-33982

SNELL [FOSTER D.], INC., FLORHAM PARK, N. J.
Assessment of industrial hazardous waste practices, rubber and plastics industry: Executive summary
[PB-282070/2] N78-33270
Assessment of industrial hazardous waste practices, rubber and plastics industry: Plastic materials and synthetics industry
[PB-282071/0] N78-33271
Assessment of industrial hazardous waste practices, rubber and plastics industry: Rubber products industry
[PB-282072/8] N78-33272
Assessment of industrial hazardous waste practices, rubber and plastics industry: Appendices
[PB-282073/6] N78-33273

SOLAFERN LTD., BOURNE, MASS.
Design package for a complete residential solar space heating and hot water system
[NASA-CR-150795] N78-33531

SOUTH CAROLINA UNIV., COLUMBIA.
The accelerating nature of electrical bias on moisture induced failures of MOS/LSI devices
N78-33336

SOUTHAMPTON UNIV. [ENGLAND].
A theoretical and experimental study of circulation control with reference to fixed wing applications
[RP-582] N78-33052

SOUTHEASTERN OKLAHOMA STATE UNIV., DURANT.
Technology utilization in a non-urban region: Further impact and technique of the Technology Use Center
[NASA-CR-157743] N78-34006

SOUTHERN METHODIST UNIV., DALLAS, TEX.
The Bayesian multiple comparisons problems for uniform distrubutions and for translated exponential distributions
N78-33851
Robustness of the MINQUE procedure in estimating variance components
N78-33853

SOUTHERN UNIV., BATON ROUGE, LA.
Determination of particle size using measurement of scatter
[NASA-CR-157741] N78-33914

SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.
Degradation studies of a trimethylolpropane triheptanoate lubricant basestock
[AD-A056825] N78-33237
Engineering services to determine acceptance limits of ultrasonic transducers for nondestructive inspection
[AD-A056648] N78-33464
Crack tip plasticity associated with corrosion-assisted fatigue
[AD-A056860] N78-33487

SOUTHWESTERN LOUISIANA UNIV., LAFAYETTE.
A decision theory approach to interval estimation
N78-33856

SPERRY SUPPORT SERVICES, HUNTSVILLE, ALA.
Creation of lumped parameter thermal model by the use of finite elements
[NASA-CR-158944] N78-33479

SRI INTERNATIONAL CORP., MENLO PARK, CALIF.
Analysis of stress ionograms
[AD-A056388] N78-33659
Acoustic sounder array for application to air pollution. Volume 1: Executive summary and user guide
[PB-282064/5] N78-33670
Acoustic sounder array for application to air pollution. Volume 2: Case studies and other appendices
[PB-282065/2] N78-33671
Specification of cloud cover using multispectral satellite radiometric data
[PB-281160/2] N78-33686

STANFORD LINEAR ACCELERATOR CENTER, CALIF.
Topics in computational geometry
[SLAC-206] N78-33839
Lattice field theories: Non-perturbative methods of analysis
[SLAC-PUB-2073] N78-33975

STANFORD UNIV., CALIF.
Strain enhanced spheroidization and superplastic flow in a lead-tin eutectic alloy, part A. Development of a phenomenological equation for superplastic flow of fine grained materials, part B
N78-33188
Spectral distortion measures for speech compression
[AD-A056833] N78-33316
The storage correlator: Theory and signal processing applications
N78-33327
Computer aided engineering of semiconductor integrated circuits
[AD-A056914] N78-33345
Microwave acoustic and bulk device technique studies
[AD-A057256] N78-33348
Transient flow of non-Newtonian power-law fluids in porous media
N78-33374
Multiple access channels with generalized feedback
N78-33745
Source and channel coding theory
N78-33767
Particle acceleration in pulsar magnetospheres
[NASA-CR-157768] N78-34015

STATE UNIV. OF NEW YORK, STONY BROOK.
Cleavage behavior as a function of composition for single crystals of the Mo-Nb system
[COO-3476-15] N78-33972

STATE UNIV. OF NEW YORK AT ALBANY.
Legislatures and information systems. An overview and analysis of recent experience
[PB-282050/4] N78-33993
Legislatures and information systems: Challenges and responses in the states
[PB-282051/2] N78-33994

STATE UNIV. OF NEW YORK AT BUFFALO.
Current voltage characteristics of gallium-arsenide metal epitaxial semiconductor field effect transistors at cryogenic temperatures
N78-33337
The design of multivalued logic gates and fault detection in multivalued logic networks
N78-33750
Measures of congestion for computer communication networks
N78-33811
The specific heat of helium four near the superfluid transition in a confined geometry
N78-33966

STATE UNIV. OF NEW YORK AT BUFFALO, AMHERST.
Forecasting and whitening filter estimation
[AD-A056540] N78-33836
An investigation of a space time clustering problem
N78-33850

A density-quantile function perspective on robust estimation
[AD-A056707] N78-33861
New nonparametric approach to the two sample problem
[AD-A056706] N78-33862
Techniques of quantile regression
[AD-A056705] N78-33863
STATE UNIV. OF NEW YORK AT STONY BROOK.
On the detection of anomalous phase errors
N78-33067
SYRACUSE UNIV., N. Y.
Mutual coupling analysis in a finite planar rectangular waveguide antenna
[AD-A056858] N78-33315
Analog algebraic decoding of linear block codes
N78-33768
The growth and crystallographic characteristics of sulfide films on [111] copper investigated by RHEED
N78-33952
SYSTEMS AND APPLIED SCIENCES CORP., RIVERDALE, MD.
Remote sensing of rain over the ocean
[NASA-CR-156843] N78-33513
SYSTEMS CONTROL, INC., PALO ALTO, CALIF.
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 1: Executive summary
[AD-A056740] N78-33074
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirement of CONUS, Alaska, and offshore. Volume 2: Analysis
[AD-A056741] N78-33075
Loran-C, Omega, and Differential Omega applied to the civil air navigation requirements of CONUS, Alaska, and offshore. Volume 3: Supporting appendices
[AD-A056742] N78-33076
SYSTEMS RESEARCH LABS., INC., DAYTON, OHIO.
A theory for longitudinal short-period pilot induced oscillations
[AD-A056982] N78-33120
Exploratory development of nondestructive evaluation techniques
[AD-A057200] N78-33468
SYSTEMS TECHNOLOGY, INC., HAWTHORNE, CALIF.
Solid State Data Acquisition and Processing System [SSDAPS]. Volume 3: Description, installation, calibration, and operating procedures
[PB-282402/7] N78-33125

T

TENNESSEE UNIV., KNOXVILLE.
Studies of microstructure-property relationships in austenitic stainless steels
[ORO-4044-7] N78-33218
Estimation of the operating characteristics of item response categories 4: Comparison of the different methods
[AD-A057161] N78-33735
Raleigh-like reflection of ultrasonic waves at a liquid-solid layer-solid interface
[AD-A056975] N78-33878
An investigation of radiative lifetimes and oscillator strengths for allowed intra L-shell transitions in multiply-charged chlorine ions
N78-33958
TETRA TECH, INC., PASADENA, CALIF.
Vulnerability of surface effect vehicles to explosion generated water waves
[AD-A055503] N78-33267
TEXAS A&M UNIV., COLLEGE STATION.
Numerical simulation of two-phase flow in vertical pipes
N78-33366
Light hydrocarbons in marine sediments
N78-33614
The transition-map-entered-variable [T-MEV] mapping technique for sequential machine design
N78-33749
An analytic study of a minimum chi-2-estimation procedure
N78-33848
Further studies of sunlight glitter on a wind-ruffled sea
[AD-A056850] N78-33917
TEXAS INSTRUMENTS, INC., DALLAS.
IC fabrication using electron-beam technology
[AD-A056717] N78-33343
Manual for the application of NURE 1974-1977 aerial gamma-ray spectrometer data
[GJBX-13-78] N78-33519
TEXAS TECHNOLOGICAL UNIV., LUBBOCK.
Radio propagation via transponder
[AD-A056899] N78-33306
Ellipsometric determination of properties of films on rough surfaces such as aluminum alloy aircraft skin
[AD-A056782] N78-33413
TEXAS UNIV. AT AUSTIN.
A data management system for engineering and scientific computing
N78-33786
A special purpose linear programming algorithm for obtaining least absolute value estimators in a linear model with dummy variables
[AD-A056762] N78-33796
A network augmenting path basic algorithm for transshipment problems
[AD-A056761] N78-33869
TEXAS UNIV. AT DALLAS.
Multiphoton absorption spectroscopy of lithium
N78-33891
TEXAS UNIV. AT EL PASO.
Size effects and electron microscopy of thin metal films
[NASA-CR-157746] N78-33194
TEXTRON BELL AEROSPACE CO., BUFFALO, N. Y.
Development, test, and calibration of a three-axis accelerometer system
[AD-A056711] N78-33408
TRACOR JITCO, INC., ROCKVILLE, MD.
Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 1
[AD-A056311] N78-33718
Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 2
[AD-A056312] N78-33719
TRANSPORTATION SYSTEMS CENTER, CAMBRIDGE, MASS.
Airline delay trends, 1972-1977
[AD-A056867] N78-33062
San Diego wheelchair accessible bus study
[PB-281087/7] N78-34010
TRW DEFENSE AND SPACE SYSTEMS GROUP, REDONDO BEACH, CALIF.
Feasibility demonstration for electroplating ultra-thin polyimide film
[NASA-CR-157775] N78-33266
The 9438 low level traveling wave amplifier anomaly, revision A
[AD-A056714] N78-33344
Extended development of variable conductance heat pipes
[NASA-CR-152183] N78-33379

U

UNDERSEA RESEARCH CORP., FALLS CHURCH, VA.
An analog FFT beamformer for acoustic applications
[AD-A057057] N78-33879
UNION CARBIDE CORP., OAK RIDGE, TENN.
Evolution of an FR-80 generated movie of opposed jet fluid flow
[K/CSD/INF-78/15] N78-33393
Creep-recovery constitutive equation and its time-independent limit
[CONF-780540-1] N78-33496
UNITED KINGDOM CHEMICAL INFORMATION SERVICES, NOTTINGHAM (ENGLAND).
Information transfer and use in chemistry
[BLL-BLRDR-5385] N78-34001
UNITED STATES STEEL CORP., MONROEVILLE, PA.
Effect of hydrostatic pressure on the deformation behavior of polyethylene and polycarbonate in tension and in compression
[AD-A056786] N78-33236
UNITED TECHNOLOGIES CORP., SUNNYVALE, CALIF.
Development of a high acceleration gas generation system
[AD-A056751] N78-33250
UNITED TECHNOLOGIES RESEARCH CENTER, EAST HARTFORD, CONN.
Derivation and evaluation of an approximate analysis for three-dimensional viscous subsonic flow with large secondary velocities
[NASA-CR-159430] N78-33044
Calculation of the energetics and collision dynamics of electronic transition lasers
[AD-A056896] N78-33428
High beta capture and mirror confinement of laser produced plasmas
[COO-2277-10] N78-33946
UNIVERSITY OF SOUTHERN CALIF., LOS ANGELES.
Proposed rocket experiments to measure the profile and intensity of the solar He1584A resonance line
[NASA-CR-156779] N78-34023
UTAH UNIV., SALT LAKE CITY.
Mechanical and thermal properties of sialon alumina composites
N78-33146
New techniques for the analysis of thermolysis products
N78-33163
Rayleigh-Brillouin scattering and structural relaxation of a viscoelastic liquid
[AD-A056763] N78-33389
Remote sounding of cloud compositions from NOAA 4 and Nimbus 6 infrared sounders
[AD-A056852] N78-33683
A symbolic system for computer-aided development of surface interpolants
[AD-A056861] N78-33756

V

VANDERBILT UNIV., NASHVILLE, TENN.
Automorphism groups of free algebras and direct powers
N78-33825
VERMONT UNIV., BURLINGTON.
Thermodynamic and transport properties of interstitial hydrogen isotopes in metal systems
[COO-3551-44] N78-33224
VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
A depolarization and attenuation experiment using the COMSTAR and CTS satellites
[NASA-CR-156848] N78-33287
The phase of the crosspolarized signal generated by millimeter wave propagation through rain
[NASA-CR-156841] N78-33288
An experimental study of the cracked nozzle problem occurring in pressure vessels
N78-33471
Analysis of graphite/polyimide rail shear specimens subjected to mechanical and thermal loading
[NASA-CR-157769] N78-33481
VIRGINIA UNIV., CHARLOTTESVILLE.
Pulsed positive negative ion chemical ionization mass spectrometry
N78-33156
Detection and location of reseaux using pictorial pattern recognition
N78-33502
VOUGHT CORP., HAMPTON, VA.
Preliminary design characteristics of a subsonic business jet concept employing laminar flow control
[NASA-CR-158958] N78-33087

W

WAPORA, INC., WASHINGTON, D. C.
Survey of environmental regulations applying to geothermal exploration, development, and use
[PB-281023/2] N78-33672
WASHINGTON STATE UNIV., PULLMAN.
Analysis of elastic behavior of orthotropic wood composite plates
N78-33145
WASHINGTON UNIV., SEATTLE.
Stability of sparingly soluble monolayers at the air-water interface
N78-33378
The estimation of air concentrations due to the diffusion, deposition and resuspension of contaminants by the wind
N78-33674
A large scale ocean-atmosphere interaction model
N78-33675
On linear operations realizable in coherent optical processor
N78-33910
WATT ENGINEERING LTD., CEDAREDGE, COLO.
On the nature and distribution of solar radiation
[HCP/T2552-01] N78-33667
WAYNE STATE UNIV., DETROIT, MICH.
The interaction between the utricles and the semicircular canals during eccentric rotation
N78-33714
Nuclear lifetimes in manganese-52
N78-33905
WEATHER WING [5TH], LANGLEY AFB, VA.
Tailored climatology of severe weather
[AD-A056988] N78-33679
WEST VIRGINIA UNIV., MORGANTOWN.
Lattice dynamics of alpha uranium
N78-33967
A recycled-water sanitary waste disposal system
N78-34004
WESTEC SERVICES, INC., SAN DIEGO, CALIF.
Engineering and economic feasibility of utilizing geothermal heat from the Heber reservoir for industrial processing purposes at Valley Nitrogen Producers Inc., El Centro agricultural chemical plant
[SAN-1323-3] N78-33562
WESTINGHOUSE DEFENSE AND ELECTRONIC SYSTEMS CENTER, BALTIMORE, MD.
Algorithms and hardware technology for image recognition
[AD-A057191] N78-33821

WESTINGHOUSE ELECTRIC CORP., BALTIMORE, MD.
Communications Link Characterization Experiment [CLCE] technical data report, volume 2
[NASA-CR-156808] N78-33286

WESTINGHOUSE ELECTRIC CORP., CRUM LYNNE, PA.
Ceramics technology readiness development program. Phase 1: Conceptual designs and material screening
[FE-2786-12] N78-33243

WESTINGHOUSE ELECTRIC CORP., PITTSBURGH, PA.
Sensor applications study. Technical report, task 1
[TID-27941] N78-33516

WILLIAMS COLL., WILLIAMSTOWN, MASS.
Study of improvement of hydrogen maser frequency standard
[NASA-CR-156836] N78-33425

WISCONSIN UNIV. - MADISON.
Groundwave propagation and radiation patterns of a vertical electric dipole over a radially varying surface impedance plane
N78-33282

Mechanical system identification and decomposition by dynamic data system methodology
N78-33443

On block relaxation techniques
[AD-A056749] N78-33754

Extension mechanisms for high-level programming languages
N78-33775

The elastic and inelastic scattering of alpha particles by oxygen-16
N78-33906

Exciton dynamics and energy transfer in pure and doped manganese fluoride
N78-33965

WORLD METEOROLOGICAL ORGANIZATION, GENEVA [SWITZERLAND].
A plan for the collection and transmission of hydrometeorological data in the Brasilian Amazon basin
[E78-10175] N78-33508

X

XEROX ELECTRO-OPTICAL SYSTEMS, PASADENA, CALIF.
Center punched solar cell module development effort
[NASA-CR-157760] N78-33536

Y

YALE UNIV., NEW HAVEN, CONN.
An experimental investigation of the critical supersaturation of five vapors in a shock tube
[AD-A056859] N78-33172

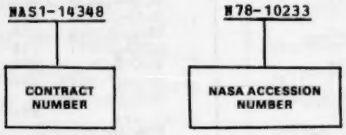
Aggregation in linear programming
N78-33774

Automatic generation of code generators
N78-33790

An estimation procedure for the 3-parameter Weibull distribution in modeling hypertension data
N78-33854

YUMA PROVING GROUND, ARIZ.
Instrumentation development of Raster scanning densitometer
[AD-A056968] N78-33309

Typical Contract Number Index Listing



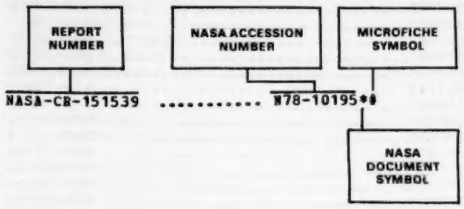
Listings in this index are arranged alphanumerically by contract number. Under each contract number the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

AF PROJ. 4860 N78-33095
AF PROJ. 1366 N78-33056
AF PROJ. 2068 N78-33055
AF PROJ. 2301 N78-33935
AF PROJ. 2304 N78-33860
AF PROJ. 2305 N78-33308 N78-33346
AF PROJ. 2307 N78-33058
AF PROJ. 2310 N78-33663
AF PROJ. 2444 N78-33916
AF PROJ. 3145 N78-33351
AF PROJ. 4600 N78-33352
AF PROJ. 4643 N78-33411
AF PROJ. 7351 N78-33468
AF PROJ. 7621 N78-33660
AF PROJ. 9567 N78-33304
AF-AFOSR-2451-73G N78-33413
AF-AFOSR-2662-74 N78-33935 N78-33936 N78-33937
AF-AFOSR-2862-75 N78-33307
AF-AFOSR-3063-76 N78-33860
AF-AFOSR-3135-77 N78-33899
AF-AFOSR-3260-77 N78-33166
AF-AFOSR-3278-77 N78-33413
AF-AFOSR-3281-77 N78-33822
AF-AFOSR-3374-77 N78-33306
AFOSR ISSA 77-0021 N78-33896 N78-33897
ARPA ORDER 2267 N78-33204
ARPA ORDER 2397 N78-33360
ARPA ORDER 2444 N78-33916
ARPA ORDER 2466 N78-33795 N78-33868
ARPA ORDER 2551 N78-33658
ARPA ORDER 2683 N78-33427
ARPA ORDER 2985 N78-33345
ARPA ORDER 3045 N78-33298 N78-33812
ARPA ORDER 3052 N78-33837
ARPA ORDER 6008 N78-33426
AT(49-24)-0293 N78-33497
AT(1171)-1407 N78-33676
DA PROJ. 1F2-62209-AH76-06 N78-33093
DA PROJ. 1G7-63702-DG-10 N78-33540
DA PROJ. 1L1-61102-AH-43 N78-33059 N78-33838
DA PROJ. 1L1-61102-AH-47 N78-33167
DA PROJ. 1L1-61102-B-53A N78-33621
DA PROJ. 1L1-62111-AH-71 N78-33662
DA PROJ. 1L7-62701-AH-92 N78-33301
DA PROJ. 1L7-63702-DG-10 N78-33541
DA PROJ. 1T1-61101-A-91A N78-33448 N78-33450
DA PROJ. 1W1-62118-AH-75 N78-33485
DA PROJ. 3E1-61102-BS-04 N78-33718 N78-33719
DA PROJ. 3F7-62173-A-819 N78-33738
DA PROJ. 4A7-62720-A-896 N78-33620
DAAB07-72-C-0259 N78-33165 N78-33297 N78-33303 N78-33751 N78-33794
DAAB07-74-C-0109 N78-33543
DAAB07-76-C-8105 N78-33343
DAAB07-77-C-0146 N78-33301
DAAB07-77-C-2644 N78-33540
DAAB07-77-C-2684 N78-33345
DAAD07-76-C-0013 N78-33662
DAAG29-75-C-0024 N78-33754
DAAG29-76-G-0038 N78-33870
DAAG29-76-G-0238 N78-33465
DAAG29-76-G-0239 N78-33861 N78-33862 N78-33863
DAAG29-77-C-0027 N78-33971
DAAG29-77-G-0072 N78-33382
DAAG29-77-G-0161 N78-33198
DAAG46-75-C-0054 N78-33200 N78-33201
DAAG46-76-C-0023 N78-33204
DAAG53-76-C-0118 N78-33541
DAAG53-76-C-0138 N78-33821
DAAJ02-76-C-0025 N78-33093
DAAK30-76-C-0004 N78-33792 N78-33793
DAAK40-76-C-0942 N78-33390
DAAK40-77-C-0020 N78-33451
DAAK40-78-C-0023 N78-33250
DAAK70-77-C-0035 N78-33353
DAEA18-73-A-0127 N78-33429
DAHC19-76-C-0019 N78-33797
DAMD17-77-C-7056 N78-33718 N78-33719
DARPA ORDER 3206 N78-33821
DI-BR-J-166023 N78-33628
DI-14-34-0001-7053 N78-33182
DI-14-34-0001-7054 N78-33182
DLA900-78-C-1715 N78-33143
DNA MIPR 78-523 N78-33908
DNA001-74-C-0298 N78-33138
DNA001-75-C-0054 N78-33128
DNA001-76-C-0201 N78-33342
DNA001-77-C-0009 N78-33317
DNA001-77-C-0013 N78-33659
DOT-FA75WA-3553 N78-33070
DOT-FA75WA-3662 N78-33074 N78-33075 N78-33076
DOT-FA75WA-3686 N78-33313
DOT-FA75WA-3722 N78-33106
DOT-FA76WAI-622 N78-33692
DOT-FA77WAI-723 N78-33615
DOT-FA77WAI-744 N78-33105
DOT-FA78WA-4075 N78-33068
DOT-HS-5-01212 N78-33125
DOT-HS-6-01307 N78-33744
DOT-NHTSA-8-0147 N78-33744
DOT-RA-75-10 N78-33458 N78-33459
DOT-RA-76-23 N78-33455 N78-33456 N78-33457
DOT-TSC-1232 N78-34011 N78-34012
DSA900-76-2471 N78-33144
EC-77-A-31-1034 N78-33537
EC-77-C-01-5084 N78-33537
EC-77-C-02-4248 N78-33592
EF-77-C-01-2468 N78-33985
EF-77-C-01-2786 N78-33243
EG-77-C-01-4028 N78-33573 N78-33593
EG-77-C-04-3768 N78-33569
EG-77-C-04-3986 N78-33566
EG-77-S-02-4385 N78-33222
EG-77-X-10-0285 N78-33598
EPA-R-802974-01-0 N78-33633
EPA-R-803283 N78-33638
EPA-68-01-3194 N78-33270 N78-33271 N78-33272 N78-33273
EPA-68-02-1745 N78-33723
EPA-68-02-2145 N78-33637
EPA-68-02-2213 N78-33630
EPA-68-02-2612 N78-33636
EPA-68-02-2832 N78-33981 N78-33982
EPA-68-03-0317 N78-33631
EPA-68-03-2371 N78-33672
EPRI PROJ. 541 N78-33175
EPRI PROJ. 918 N78-33576
EX-76-C-01-2295-006 N78-33563 N78-33564
EX-76-C-01-2295-023 N78-33454
EX-76-C-01-2326 N78-33210
EX-76-C-01-2446 N78-33398
EX-76-C-01-2552 N78-33667
EY-76-C-02-0016 N78-33584
EY-76-C-02-1198 N78-33173 N78-33239
EY-76-C-02-2277 N78-33946
EY-76-C-02-2698 N78-33595
EY-76-C-02-2746 N78-33207
EY-76-C-02-3073 N78-33945
EY-76-C-02-3490 N78-33704
EY-76-C-02-4082 N78-33516
EY-76-C-03-0167-038 N78-33221

EY-76-C-03-0575
N78-33839
EY-76-C-03-1018
N78-33941
EY-76-C-03-1108
N78-33571
EY-76-C-03-1198
N78-33553
EY-76-C-03-1269
N78-33515
EY-76-C-03-1323
N78-33562
EY-76-C-04-0053
N78-33940
EY-76-C-04-0613
N78-33139
N78-33397
EY-76-C-04-0656
N78-33176
EY-76-C-04-0789
N78-33083
N78-33121
N78-33209
N78-33269
N78-33355
N78-33356
N78-33357
N78-33358
N78-33395
N78-33414
N78-33417
N78-33488
N78-33494
N78-33495
N78-33560
N78-33561
N78-33580
N78-33596
N78-33800
N78-33815
N78-33816
N78-33841
N78-33973
EY-76-C-04-3533
N78-33205
N78-33238
EY-76-C-05-5123
N78-33583
EY-76-C-05-00333
N78-33550
EY-76-C-06-1830
N78-33211
N78-33545
N78-33546
N78-33565
N78-33706
N78-33720
EY-76-C-07-1570
N78-33567
EY-76-C-09-0001
N78-33517
EY-76-C-13-1664
N78-33519
EY-76-C-14-2170
N78-33180
EY-76-S-02-2007
N78-33434
N78-33435
EY-76-S-02-2462
N78-33213
EY-76-S-02-2793
N78-33899
EY-76-S-02-2923
N78-33241
EY-76-S-02-2982
N78-33257
EY-76-S-02-3476
N78-33972
EY-76-S-02-3551
N78-33224
EY-76-S-03-0326
N78-33975
EY-76-S-04-3723
N78-33575
EY-76-S-05-4044
N78-33218
FAA PROJ. 154-451-110
N78-33063
FAA PROJ. 213-061-110
N78-33291
F04606-75-A-0030
N78-33432
F04701-75-C-0135
N78-33081
N78-33082
F04701-75-C-0257
N78-33344
F04701-77-C-0078
N78-33136
F08606-78-C-0005
N78-33658
F08635-77-C-0062
N78-33055
F19628-73-C-0282
N78-33916
F19628-74-C-0114
N78-33408
F19628-75-C-0007
N78-33666
F19628-75-C-0044
N78-33664
F19628-75-C-0072
N78-33349
F19628-75-C-0187
N78-33663
F19628-76-C-0004
N78-33660
F19628-76-C-0013
N78-33661
F19628-76-C-0086
N78-33310
F19628-76-C-0107
N78-33683
F19628-76-C-0229
N78-33347
F19628-76-C-0256
N78-33141
F19628-76-C-0306
N78-33677
F19628-77-C-0001
N78-33131
N78-33514
F19628-77-C-0058
N78-33680
F19628-77-C-0066
N78-33678
F19628-77-C-0093
N78-33308
N78-33346
F19628-77-C-0178
N78-33977
F19628-77-C-0231
N78-33665
F19628-78-C-0002
N78-33426
F30602-74-C-0038
N78-33348
F30602-75-C-0118
N78-33304
F30602-76-C-0143
N78-33352
F33615-75-C-0127
N78-33742
F33615-75-C-3016
N78-33095
F33615-75-C-3093
N78-33483
F33615-75-C-3126
N78-33056
F33615-75-C-5106
N78-33484
F33615-75-C-5152
N78-33742
F33615-76-C-1240
N78-33100
F33615-76-C-1299
N78-33097
F33615-76-C-2020
N78-33237
F33615-76-C-2050
N78-33351
F33615-76-C-2171
N78-33542
F33615-76-C-3035
N78-33088
F33615-76-C-3058
N78-33449
F33615-76-C-3146
N78-33058
F33615-76-C-5313
N78-33468
F33615-77-C-3008
N78-33736
F33615-77-C-3011
N78-33120
F41608-77-C-1381
N78-33464
F44620-73-C-0065
N78-33316
F44620-73-C-0074
N78-33795
N78-33868
F44620-76-C-0008
N78-33743
F49620-77-C-0064
N78-33428
GS-00-DS-(P)-94008
N78-33207
JPL-954328 N78-33535
JPL-954350 N78-33265
JPL-954492 N78-33405
JPL-954693 N78-33536
JPL-954697 N78-33644
JPL-954698 N78-33533
JPL-954771 N78-33266
JPL-954848 N78-33534
MIPR-2165-71-8010
N78-33755
NASA ORDER S-53742-AG
N78-33539
NASW-2222 N78-34019
NASW-2791 N78-33041
N78-33710
NASW-2918 N78-34020
NASW-3007 N78-34006
NASW-3198 N78-33643
N78-33915
NASW-3199 N78-33042
N78-33140
N78-33338
N78-33642
N78-33703
N78-33713
N78-34017
NAS1-13500 N78-33087
NAS1-13943 N78-33446
NAS1-14372 N78-33406
NAS1-14625 N78-33086
NAS1-14999 N78-33479
NAS2-6914 N78-33784
NAS2-7091 N78-33113
N78-33114
N78-33115
N78-33116
N78-33117
N78-33118
NAS2-7738 N78-33085
NAS2-8377 N78-33127
NAS2-9357 N78-33876
NAS2-9580 N78-33506
NAS2-9726 N78-33384
NAS2-9834 N78-33379
NAS3-14302 N78-33463
NAS3-17862 N78-33527
NAS3-18526 N78-33103
NAS3-19752 N78-33044
NAS3-20044 N78-33104
NAS3-20368 N78-33478
NAS5-20729 N78-33286
NAS5-22423 N78-33654
NAS5-22545 N78-33702
NAS5-22577 N78-33287
N78-33288
NAS5-22822 N78-33505
NAS5-23520 N78-33425
NAS5-23701 N78-33340
NAS5-24087 N78-33646
NAS5-24166 N78-34025
NAS5-24198 N78-33513
NAS6-2730 N78-33696
NAS7-100 N78-33266
N78-33405
N78-33644
N78-33645
N78-33716
N78-33789
N78-34007
N78-34022
NAS8-31731 N78-33383
NAS8-31940 N78-33341
NAS8-32246 N78-33531
NAS8-32251 N78-33529
NAS8-32253 N78-33532
NAS8-32255 N78-33530
NAS8-32259 N78-33528
NAS8-32658 N78-33134
NAS8-32666 N78-33142
NAS8-32851 N78-34024
NAS13-50 N78-33251
NBS-G7-9003 N78-33184
NGR-05-020-668
N78-34015
NGR-14-005-181
N78-33653
NGR-33-010-188
N78-33381
NOAA-04-6-022-44007
N78-33687
NOAA-04-6-022-44031
N78-33692
NR PROJ. 012-512
N78-33427
NR PROJ. 032-574(471)
N78-33231
N78-33232
N78-33233
N78-33234
NR PROJ. 036-109
N78-33487
NR PROJ. 042-372
N78-33465
NR PROJ. 061-135
N78-33382
NR PROJ. 089-114
N78-33267
NR PROJ. 381-018
N78-33969
NRC-04-75-182
N78-33470
NSF AEN-73-02918-A01
N78-33670
N78-33671
NSF AER-77-11545
N78-33264
NSF APR-76-01034
N78-33757
N78-33758
N78-33759
N78-33760
N78-33842
N78-33843
N78-33844
NSF ATM-74-09448-A02
N78-33687
NSF ATM-75-14915
N78-33686
NSF ATM-75-18699
N78-33681
NSF ATM-77-00933
N78-33653
NSF ATM-77-23757
N78-33685
NSF DMR-76-81083
N78-33381
NSF DMR-76-82088
N78-33165
NSF DSI-76-05484
N78-33999
NSF DSI-76-08930-A01
N78-33991
N78-33992
NSF ENG-75-0149
N78-33401
NSF ENG-75-22621
N78-33297
NSF ENV-76-14519
N78-33684
NSF ERP-74-20555
N78-33319
NSF GI-34274 N78-33758
N78-33759
N78-33760
N78-33842
N78-33843
N78-33844

NSF INT-76-84216 N78-33303
NSF MCS-73-03488 N78-33751
NSF MCS-74-13017 N78-33756
NSF MCS-76-07247 N78-33860
NSF MCS-76-19072 N78-33777
NSF MCS-707-00100 N78-33796
NSF PHY-74-12226 N78-33425
NSF SOC-76-05827 N78-33822
NSF CDSI-76-15515 N78-33986 N78-33987 N78-33988 N78-33989 N78-33990
NSG-1248 N78-33382
NSG-1337 N78-33195
NSG-1400 N78-33048
NSG-1446 N78-33786
NSG-3031 N78-33387
NSG-3127 N78-33386
NSG-3146 N78-33194
NSG-4009 N78-33444
NSG-5108 N78-34023
NSG-8056 N78-33914
NSG-8057 N78-33788
N00014-64-C-1183 N78-33812
N00014-71-A-0121-0001 N78-33878
N00014-71-C-0169 N78-33169
N00014-72-C-0419 N78-33752
N00014-72-C-0508 N78-33836
N00014-75-C-060 N78-33316
N00014-75-C-0152 N78-33681
N00014-75-C-0209 N78-33409
N00014-75-C-0247 N78-33970
N00014-75-C-0263 N78-33172
N00014-75-C-0273 N78-33057
N00014-75-C-0292 N78-33202 N78-33203
N00014-75-C-0293 N78-33296
N00014-75-C-0476 N78-33354 N78-33934
N00014-75-C-0511 N78-33382
N00014-75-C-0527 N78-33917
N00014-75-C-0569 N78-33796 N78-33869
N00014-75-C-0573 N78-33753
N00014-75-C-0580 N78-33486
N00014-75-C-0616 N78-33869
N00014-75-C-0685 N78-33168
N00014-75-C-0908 N78-33389
N00014-75-C-0915 N78-33969
N00014-75-C-1038 N78-33487
N00014-75-C-1183 N78-33298
N00014-76-C-0064 N78-33482
N00014-76-C-0074 N78-33837
N00014-76-C-0123 N78-33427
N00014-76-C-0177 N78-33878
N00014-76-C-0225 N78-33315
N00014-76-C-0341 N78-33754
N00014-76-C-0345 N78-33777
N00014-76-C-0434 N78-33412
N00014-76-C-0584 N78-33295
N00014-76-C-0838 N78-33932
N00014-76-C-0855 N78-33236
N00014-76-C-1092 N78-33171
N00014-77-C-0096 N78-33978
N00014-77-C-0157 N78-33756
N00014-77-C-0263 N78-33465 N78-33466
N00014-77-C-0360 N78-33735
N00014-77-C-0441 N78-33231 N78-33233 N78-33234
N00014-77-C-0485 N78-33202 N78-33203
N00014-77-C-0494 N78-33879
N00017-73-C-1418 N78-33387 N78-33388
N00019-77-C-0299 N78-33311
N00024-76-C-0261 N78-33267
N00024-77-C-0441 N78-33232
N00123-75-C-0328 N78-33077 N78-33078 N78-33079 N78-33080
N00173-78-C-0070 N78-33968
PHS-LM-64753 N78-33998
PROJ. P14369-E N78-33382
PROJ. 7354 N78-33566
RR0110242 N78-33293
RR0130143 N78-33907
RR0330341 N78-33835
SF33354391 N78-33433
SRI PROJ. 5908 N78-33659
SRS-22-59015 N78-33323
W-31-109-ENG-38 N78-33217 N78-33240 N78-33359 N78-33399 N78-33416 N78-33585 N78-33588 N78-33943
W-7405-ENG-26 N78-33206 N78-33208 N78-33215 N78-33219 N78-33220 N78-33393 N78-33436 N78-33437 N78-33452 N78-33453 N78-33490 N78-33496 N78-33570 N78-33578 N78-33705 N78-33880 N78-33898 N78-33938 N78-33939 N78-33942
W-7405-ENG-36 N78-33392 N78-33394 N78-33396 N78-33415 N78-33418 N78-33558 N78-33559 N78-33572 N78-33586 N78-33623 N78-33625 N78-33721 N78-33754 N78-33900
W-7405-ENG-48 N78-33174 N78-33177 N78-33181 N78-33212 N78-33216 N78-33223 N78-33242 N78-33244 N78-33258 N78-33260 N78-33268 N78-33491 N78-33492 N78-33493 N78-33582 N78-33589 N78-33624 N78-33798 N78-33799 N78-33944
W-7405-ENG-82 N78-33178 N78-33179
W-7405-ENG-92-077 N78-33259
WF57572401 N78-33619
ZF54590001 N78-33197
141-95-01 N78-33444
141-95-01-12 N78-33538
141-95-01-19 N78-33407
175-20-40 N78-33512
176-30-33-01 N78-33616
176-30-34-05 N78-33617
177-54-43 N78-33499
195-21-04 N78-34014
195-21-04-02 N78-34021
505-02-13-42 N78-33152
505-03-13 N78-33875
505-03-32 N78-33104
505-04 N78-33107 N78-33108 N78-33109 N78-33196 N78-33447
505-05 N78-33110
505-05-22 N78-33103
505-06-15-03 N78-33385
505-08 N78-33618
505-09-13-11 N78-33873 N78-33874
505-09-53-01 N78-33731
505-10-21 N78-33085
505-11-13-01 N78-33051
505-11-23-13 N78-33050
505-11-54 N78-33054
506-16-31 N78-33384
506-16-43-11 N78-33230
506-17-21-01 N78-33791
506-21-33-02 N78-33135
506-25-36 N78-33424
510-54-03-01 N78-33776
515-52-10 N78-33043
516-50-23-01 N78-33087
521-71-01 N78-33053
524-71-03-01 N78-33153
610-22 N78-33137
743-04-13-02 N78-33047
791-40-13-01 N78-33061

Typical Report/Accession Number Index Listing



Listings in this index are arranged alphanumerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche. Accession numbers followed by a plus sign (+) are not available on microfiche because of size or reproducibility.

A-5137 ..... N78-33289*#
A-7262 ..... N78-33043*#
A-7524 ..... N78-34014*#
A-7549 ..... N78-34021*#

AAE-TR-78-5 ..... N78-33048*#

ACBU-SER-3-NO-6 ..... N78-33664 #

AD-A045425 ..... N78-33049 #
AD-A055160 ..... N78-33656 #
AD-A055285 ..... N78-33657 #
AD-A055424 ..... N78-33738 #
AD-A055448 ..... N78-33969 #
AD-A055464 ..... N78-33124 #
AD-A055469 ..... N78-33619 #
AD-A055503 ..... N78-33267 #
AD-A055526 ..... N78-33071 #
AD-A055532 ..... N78-33741 #
AD-A055533 ..... N78-33740 #
AD-A055570 ..... N78-33426 #
AD-A055652 ..... N78-33860 #
AD-A055685 ..... N78-33292 #
AD-A055691 ..... N78-33739 #
AD-A055706 ..... N78-33732 #
AD-A055714 ..... N78-33197 #
AD-A055870 ..... N78-33387*#
AD-A056030 ..... N78-33427 #
AD-A056048 ..... N78-33753 #
AD-A056050 ..... N78-33448 #
AD-A056066 ..... N78-33795 #
AD-A056072 ..... N78-33868 #
AD-A056094 ..... N78-33168 #
AD-A056095 ..... N78-33466 #
AD-A056096 ..... N78-33465 #
AD-A056100 ..... N78-33300 #
AD-A056101 ..... N78-33514 #
AD-A056102 ..... N78-33131 #
AD-A056103 ..... N78-33977 #
AD-A056105 ..... N78-33098 #
AD-A056109 ..... N78-33136 #
AD-A056110 ..... N78-33751 #
AD-A056111 ..... N78-33794 #
AD-A056116 ..... N78-33742 #
AD-A056121 ..... N78-33752 #
AD-A056123 ..... N78-33167 #
AD-A056124 ..... N78-33088 #
AD-A056125 ..... N78-33968 #
AD-A056139 ..... N78-33932 #
AD-A056140 ..... N78-33658 #
AD-A056143 ..... N78-33295 #
AD-A056173 ..... N78-33301 #
AD-A056269 ..... N78-33812 #
AD-A056302 ..... N78-33353 #
AD-A056303 ..... N78-33251*#
AD-A056308 ..... N78-33390 #
AD-A056310 ..... N78-33111 #
AD-A056311 ..... N78-33718 #
AD-A056312 ..... N78-33719 #
AD-A056313 ..... N78-33255 #
AD-A056316 ..... N78-33317 #
AD-A056317 ..... N78-33138 #
AD-A056323 ..... N78-33984 #
AD-A056324 ..... N78-33314 #
AD-A056334 ..... N78-33467 #
AD-A056343 ..... N78-33055 #
AD-A056344 ..... N78-33870 #
AD-A056345 ..... N78-33812 #
AD-A056346 ..... N78-33165 #
AD-A056348 ..... N78-33097 #
AD-A056356 ..... N78-33198 #
AD-A056360 ..... N78-33835 #
AD-A056361 ..... N78-33293 #
AD-A056362 ..... N78-33908 #
AD-A056363 ..... N78-33907 #
AD-A056369 ..... N78-33838 #
AD-A056370 ..... N78-33543 #
AD-A056372 ..... N78-33483 #
AD-A056373 ..... N78-33484 #
AD-A056378 ..... N78-33429 #
AD-A056388 ..... N78-33659 #
AD-A056390 ..... N78-33128 #
AD-A056392 ..... N78-33342 #
AD-A056423 ..... N78-33431 #
AD-A056424 ..... N78-33312 #
AD-A056429 ..... N78-33350 #
AD-A056432 ..... N78-33430 #
AD-A056435 ..... N78-33305 #
AD-A056439 ..... N78-33410 #
AD-A056516 ..... N78-33299 #
AD-A056540 ..... N78-33836 #
AD-A056542 ..... N78-33930 #
AD-A056543 ..... N78-33792 #
AD-A056544 ..... N78-33793 #
AD-A056550 ..... N78-33298 #
AD-A056552 ..... N78-33297 #
AD-A056553 ..... N78-33089 #
AD-A056556 ..... N78-33877 #
AD-A056557 ..... N78-33154 #
AD-A056560 ..... N78-33813 #
AD-A056567 ..... N78-33482 #
AD-A056570 ..... N78-33677 #
AD-A056571 ..... N78-33678 #
AD-A056591 ..... N78-33540 #
AD-A056629 ..... N78-33078 #
AD-A056631 ..... N78-33080 #
AD-A056643 ..... N78-33199 #
AD-A056645 ..... N78-33296 #
AD-A056647 ..... N78-33294 #
AD-A056648 ..... N78-33464 #
AD-A056649 ..... N78-33166 #
AD-A056662 ..... N78-33486 #
AD-A056664 ..... N78-33755 #
AD-A056685 ..... N78-33079 #
AD-A056694 ..... N78-33254 #
AD-A056695 ..... N78-33132 #
AD-A056702 ..... N78-33077 #
AD-A056705 ..... N78-33863 #
AD-A056706 ..... N78-33862 #
AD-A056707 ..... N78-33861 #
AD-A056710 ..... N78-33349 #
AD-A056711 ..... N78-33408 #
AD-A056712 ..... N78-33449 #
AD-A056714 ..... N78-33344 #
AD-A056716 ..... N78-33661 #
AD-A056717 ..... N78-33343 #
AD-A056740 ..... N78-33074 #
AD-A056741 ..... N78-33075 #
AD-A056742 ..... N78-33076 #
AD-A056749 ..... N78-33754 #
AD-A056751 ..... N78-33250 #
AD-A056761 ..... N78-33869 #
AD-A056762 ..... N78-33796 #
AD-A056763 ..... N78-33389 #
AD-A056770 ..... N78-33119 #
AD-A056780 ..... N78-33063 #
AD-A056782 ..... N78-33413 #

AD-A056783 ..... N78-33105 #
AD-A056786 ..... N78-33236 #
AD-A056788 ..... N78-33934 #
AD-A056789 ..... N78-33354 #
AD-A056811 ..... N78-33081 #
AD-A056812 ..... N78-33082 #
AD-A056822 ..... N78-33971 #
AD-A056824 ..... N78-33204 #
AD-A056825 ..... N78-33237 #
AD-A056849 ..... N78-33822 #
AD-A056850 ..... N78-33917 #
AD-A056851 ..... N78-33937 #
AD-A056852 ..... N78-33683 #
AD-A056853 ..... N78-33316 #
AD-A056855 ..... N78-33936 #
AD-A056856 ..... N78-33935 #
AD-A056857 ..... N78-33095 #
AD-A056858 ..... N78-33315 #
AD-A056859 ..... N78-33172 #
AD-A056860 ..... N78-33487 #
AD-A056861 ..... N78-33756 #
AD-A056867 ..... N78-33062 #
AD-A056894 ..... N78-33307 #
AD-A056896 ..... N78-33428 #
AD-A056899 ..... N78-33306 #
AD-A056900 ..... N78-33797 #
AD-A056905 ..... N78-33737 #
AD-A056914 ..... N78-33345 #
AD-A056920 ..... N78-33681 #
AD-A056930 ..... N78-33072 #
AD-A056940 ..... N78-33734 #
AD-A056941 ..... N78-33070 #
AD-A056942 ..... N78-33090 #
AD-A056943 ..... N78-33662 #
AD-A056944 ..... N78-33099 #
AD-A056946 ..... N78-33058 #
AD-A056951 ..... N78-33093 #
AD-A056960 ..... N78-33814 #
AD-A056961 ..... N78-33933 #
AD-A056962 ..... N78-33409 #
AD-A056964 ..... N78-33092 #
AD-A056965 ..... N78-33200 #
AD-A056966 ..... N78-33201 #
AD-A056968 ..... N78-33309 #
AD-A056975 ..... N78-33878 #
AD-A056976 ..... N78-33094 #
AD-A056978 ..... N78-33664 #
AD-A056982 ..... N78-33120 #
AD-A056983 ..... N78-33736 #
AD-A056985 ..... N78-33743 #
AD-A056986 ..... N78-33304 #
AD-A056988 ..... N78-33679 #
AD-A056993 ..... N78-33682 #
AD-A056994 ..... N78-33411 #
AD-A056996 ..... N78-33352 #
AD-A056997 ..... N78-33620 #
AD-A057002 ..... N78-33036 #
AD-A057006 ..... N78-33351 #
AD-A057010 ..... N78-33056 #
AD-A057033 ..... N78-33303 #
AD-A057057 ..... N78-33879 #
AD-A057059 ..... N78-33068 #
AD-A057062 ..... N78-33169 #
AD-A057065 ..... N78-33302 #
AD-A057112 ..... N78-33069 #
AD-A057113 ..... N78-33733 #
AD-A057115 ..... N78-33916 #
AD-A057122 ..... N78-33073 #
AD-A057141 ..... N78-33203 #
AD-A057142 ..... N78-33202 #
AD-A057144 ..... N78-33660 #
AD-A057145 ..... N78-33541 #
AD-A057151 ..... N78-33388 #
AD-A057153 ..... N78-33690 #
AD-A057158 ..... N78-33057 #
AD-A057159 ..... N78-33100 #
AD-A057160 ..... N78-33978 #
AD-A057161 ..... N78-33735 #
AD-A057163 ..... N78-33837 #
AD-A057188 ..... N78-33666 #
AD-A057191 ..... N78-33821 #
AD-A057195 ..... N78-33170 #
AD-A057196 ..... N78-33485 #
AD-A057197 ..... N78-33235 #
AD-A057199 ..... N78-33313 #
AD-A057200 ..... N78-33468 #
AD-A057201 ..... N78-33171 #
AD-A057202 ..... N78-33621 #
AD-A057215 ..... N78-33433 #

AD-A057218 ..... N78-33896 #
AD-A057219 ..... N78-33897 #
AD-A057231 ..... N78-33091 #
AD-A057235 ..... N78-33252 #
AD-A057236 ..... N78-33450 #
AD-A057237 ..... N78-33059 #
AD-A057238 ..... N78-33253 #
AD-A057239 ..... N78-33231 #
AD-A057240 ..... N78-33232 #
AD-A057241 ..... N78-33233 #
AD-A057242 ..... N78-33234 #
AD-A057243 ..... N78-33970 #
AD-A057244 ..... N78-33311 #
AD-A057245 ..... N78-33451 #
AD-A057248 ..... N78-33432 #
AD-A057249 ..... N78-33663 #
AD-A057250 ..... N78-33347 #
AD-A057251 ..... N78-33141 #
AD-A057252 ..... N78-33542 #
AD-A057253 ..... N78-33308 #
AD-A057254 ..... N78-33665 #
AD-A057255 ..... N78-33310 #
AD-A057256 ..... N78-33348 #
AD-A057257 ..... N78-33346 #
AD-A057258 ..... N78-33544 #
AD-A057280 ..... N78-33291 #
AD-A057369 ..... N78-33655 #
AD-A057370 ..... N78-33106 #
AD-A057442 ..... N78-33290 #
AD-A057451 ..... N78-33615 #

AD-E000170 ..... N78-33908 #
AD-E000171 ..... N78-33907 #
AD-E000172 ..... N78-33293 #
AD-E000175 ..... N78-33835 #
AD-E300247 ..... N78-33317 #
AD-E300249 ..... N78-33138 #
AD-E300253 ..... N78-33128 #
AD-E300268 ..... N78-33342 #
AD-E300271 ..... N78-33659 #
AD-E400146 ..... N78-33252 #
AD-E400149 ..... N78-33255 #
AD-E400152 ..... N78-33253 #
AD-E400171 ..... N78-33235 #
AD-E400179 ..... N78-33251*#
AD-E410043 ..... N78-33450 #
AD-E430057 ..... N78-33838 #
AD-E430067 ..... N78-33485 #
AD-E430068 ..... N78-33170 #
AD-E430074 ..... N78-33059 #

AEROCHEM-TP-364 ..... N78-33398 #

AFAL-TR-77-179 ..... N78-33097 #
AFAL-TR-78-59 ..... N78-33100 #

AFAPL-TR-77-69 ..... N78-33351 #
AFAPL-TR-77-87 ..... N78-33237 #
AFAPL-TR-78-19-VOL-3-PT-2 ..... N78-33542 #

AFATL-TR-77-129 ..... N78-33055 #

AFFDL-TR-76-48-PT-2 ..... N78-33056 #
AFFDL-TR-77-57 ..... N78-33120 #
AFFDL-TR-77-79-VOL-1 ..... N78-33483 #
AFFDL-TR-77-118 ..... N78-33058 #
AFFDL-TR-77-135 ..... N78-33095 #
AFFDL-TR-78-3 ..... N78-33736 #
AFFDL-TR-78-16 ..... N78-33088 #
AFFDL-TR-78-38-PT-2 ..... N78-33449 #

AFGL-ERP-628 ..... N78-33933 #

AFGL-IP-263 ..... N78-33411 #

AFGL-TR-77-0239 ..... N78-33660 #
AFGL-TR-77-0252 ..... N78-33683 #
AFGL-TR-77-0275-1/2 ..... N78-33661 #
AFGL-TR-78-0003 ..... N78-33408 #
AFGL-TR-78-0005 ..... N78-33680 #
AFGL-TR-78-0013 ..... N78-33663 #
AFGL-TR-78-0025 ..... N78-33677 #
AFGL-TR-78-0031 ..... N78-33678 #
AFGL-TR-78-0048 ..... N78-33411 #
AFGL-TR-78-0050 ..... N78-33347 #
AFGL-TR-78-0064 ..... N78-33933 #
AFGL-TR-78-0073 ..... N78-33666 #
AFGL-TR-78-0092-2 ..... N78-33664 #

AFGL-TR-78-0095 ..... N78-33349 #
AFGL-TR-78-0106 ..... N78-33141 #
AFGL-TR-78-0162 ..... N78-33166 #

AFHRL-TR-78-4 ..... N78-33741 #
AFHRL-TR-78-9 ..... N78-33739 #
AFHRL-TR-78-18 ..... N78-33740 #

AFIT/DS/EE/78-2 ..... N78-33299 #
AFIT/DS/PH/78-1 ..... N78-33930 #
AFIT/GAE/AA/78M-16 ..... N78-33089 #
AFIT/GCS/EE/78-8 ..... N78-33124 #
AFIT/GE/EE/78M-9 ..... N78-33732 #

AFML-TR-77-193 ..... N78-33484 #
AFML-TR-78-13 ..... N78-33468 #
AFML-TR-78-42 ..... N78-33154 #

AFOSR-78-0055TR-REV ..... N78-33743 #
AFOSR-78-1022TR ..... N78-33860 #
AFOSR-78-1085TR ..... N78-33795 #
AFOSR-78-1092TR ..... N78-33868 #
AFOSR-78-1167TR-VOL-1 ..... N78-33896 #
AFOSR-78-1168TR-VOL-2 ..... N78-33897 #
AFOSR-78-1187TR ..... N78-33428 #
AFOSR-78-1189TR ..... N78-33936 #
AFOSR-78-1191TR ..... N78-33935 #
AFOSR-78-1192TR ..... N78-33937 #
AFOSR-78-1196TR ..... N78-33306 #
AFOSR-78-1220TR ..... N78-33413 #
AFOSR-78-1224TR ..... N78-33307 #

AIRESEARCH-21-2817 ..... N78-33104*#

ALO-41/1 ..... N78-33560 #
ALO-3723-76/3 ..... N78-33575 #
ALO-3786-2 ..... N78-33569 #

AMMRC-TR-78-23 ..... N78-33204 #
AMMRC-TR-78-26-VOL-1 ..... N78-33200 #
AMMRC-TR-78-26-VOL-2 ..... N78-33201 #

AMRC-HESS-78-2 ..... N78-33742 #

AMRL-TR-78-35 ..... N78-33742 #

AMSAA-IN-P-69 ..... N78-33090 #

ANL-FE-49622-TM01 ..... N78-33416 #

ANL-OTEC-78-1 ..... N78-33399 #

ANL/MSD-78-3 ..... N78-33217 #
ANL/MSD-78-5 ..... N78-33240 #

AR-13 ..... N78-33539*#
AR-79 ..... N78-33653*#

ARBRL-MR-02844 ..... N78-33170 #

ARBRL-TR-02068 ..... N78-33838 #
ARBRL-TR-02074 ..... N78-33059 #
ARCSL-TR-78038 ..... N78-33450 #

ARI-RR-118 ..... N78-33347 #

ARI-TR-78-A6 ..... N78-33797 #

ARL/PSU/TM-78-161 ..... N78-33388 #

ARLCD-TR-77010 ..... N78-33235 #
ARLCD-TR-77051 ..... N78-33252 #
ARLCD-TR-77052 ..... N78-33255 #
ARLCD-TR-77054 ..... N78-33253 #

ARO-12454.2-MS ..... N78-33198 #
ARO-13149.6-M ..... N78-33870 #
ARO-13845.3-M ..... N78-33863 #
ARO-13845.4-M ..... N78-33862 #
ARO-13845.5-M ..... N78-33861 #
ARO-15216.1-P ..... N78-33971 #

ARTSD-CR-78003 ..... N78-33251*#

ASD-TR-78-16 ..... N78-33734 #
ASD-TR-78-17 ..... N78-33092 #

ASME/RCL-1977/1 ..... N78-33245 #
ASME/RCL-1978/1 ..... N78-33245 #

ASRL-TR-190-1 ..... N78-33454 #

ATR-78(7613)-1 ..... N78-33638 #

BDX-613-1757-REV ..... N78-33397 #
BDX-613-1811-REV ..... N78-33139 #

BERC/OP-77/28 ..... N78-33458 #
BERC/OP-77/28 ..... N78-33459 #
BERC/OP-77/47-1 ..... N78-33455 #
BERC/OP-77/47-2 ..... N78-33456 #
BERC/OP-77/48 ..... N78-33457 #
BERC/RI-78/2 ..... N78-33261 #

BLL-BLRDR-5385 ..... N78-34001 #

BLS-515 ..... N78-33805 #

BLS/DP-78/001A ..... N78-33802 #
BLS/DP-78/001B ..... N78-33804 #
BLS/DP-78/001C ..... N78-33803 #
BLS/DP-78/001D ..... N78-33805 #

BM-IC-8765 ..... N78-33581 #

BM-TPR-105 ..... N78-33628 #

BNL-24216 ..... N78-33584 #

BPA-BIO-77-1 ..... N78-33722 #

BRA372/010 ..... N78-33508*#

CALSPAN-VE-3104-M-1 ..... N78-34019*#

CCS-272 ..... N78-33869 #
CCS-318 ..... N78-33796 #

CED-78-93 ..... N78-33520 #

CER-77-78WZS-HG1322 ..... N78-33386*#

CERL-TR-N-43 ..... N78-33620 #

CMU-CS-78-109 ..... N78-33868 #

COM-73-11674 ..... N78-33402 #
COM-73-11797 ..... N78-33362 #
COM-74-10242 ..... N78-33498 #
COM-74-10869 ..... N78-33919 #
COM-74-10871 ..... N78-33885 #
COM-74-11102 ..... N78-33602 #
COM-74-11499 ..... N78-33404 #

CONF-770397-1 ..... N78-33494 #
CONF-770889-2 ..... N78-33975 #
CONF-771125-3 ..... N78-33588 #
CONF-780114-7 ..... N78-33584 #
CONF-780114-8 ..... N78-33585 #
CONF-780135-1 ..... N78-33435*#
CONF-780135-3 ..... N78-33434 #
CONF-780137-1 ..... N78-33177 #
CONF-780213-5 ..... N78-33491 #
CONF-780305-15 ..... N78-33559 #
CONF-780324-2 ..... N78-33625 #
CONF-780331-2 ..... N78-33798 #
CONF-780333-2 ..... N78-33898 #
CONF-780336-2 ..... N78-33943 #
CONF-780339-1 ..... N78-33359 #
CONF-780415-2 ..... N78-33704 #
CONF-780417-5 ..... N78-33181 #
CONF-780425-1 ..... N78-33561 #
CONF-780426-1 ..... N78-33589 #
CONF-780427-1 ..... N78-33880 #
CONF-780430-2 ..... N78-33269 #
CONF-780431-3 ..... N78-33221 #
CONF-780431-5 ..... N78-33944 #
CONF-780434-1 ..... N78-33174 #
CONF-780435-1 ..... N78-33517 #
CONF-780437-1 ..... N78-33393 #
CONF-780447-2 ..... N78-33586 #
CONF-780510-1 ..... N78-33899 #
CONF-780515-1 ..... N78-33209 #
CONF-780518-2 ..... N78-33816 #
CONF-780524-1 ..... N78-33121 #

CONF-780525-1 ..... N78-33083 #
CONF-780525-2 ..... N78-33800 #
CONF-780531-1 ..... N78-33392 #
CONF-780531-3 ..... N78-33396 #
CONF-780540-1 ..... N78-33496 #
CONF-780604-1 ..... N78-33357 #
CONF-780609-3 ..... N78-33495 #
CONF-780610-1 ..... N78-33356 #
CONF-780612-1 ..... N78-33623 #
CONF-780612-2 ..... N78-33721 #
CONF-7709115-1 ..... N78-33223 #

CONS/5084-1 ..... N78-33537*#

COO-1198-1191 ..... N78-33173 #
COO-1198-1205 ..... N78-33239 #
COO-1407-65 ..... N78-33676 #
COO-2007-94 ..... N78-33434 #
COO-2007-95 ..... N78-33435*#
COO-2277-10 ..... N78-33946 #
COO-2462-4 ..... N78-33213 #
COO-2698-2 ..... N78-33595 #
COO-2746-1 ..... N78-33207*#
COO-2793-11 ..... N78-33899 #
COO-2923-02 ..... N78-33241 #
COO-2982-21 ..... N78-33257 #
COO-3476-15 ..... N78-33972 #
COO-3551-44 ..... N78-33224 #
COO-4248-1 ..... N78-33592 #
COO-4385-2 ..... N78-33222 #

CSD-2658-FR ..... N78-33250 #

CSIR-CENG-243 ..... N78-33183 #

CSIR-FIS-162 ..... N78-33509*#

CSTR-318 ..... N78-33754 #

CSU-FMWEP-NASLRC-1 ..... N78-33386*#

CWS-03-77A ..... N78-33743 #

C6352-17 ..... N78-33106 #

DELET-TR-74-0109-F ..... N78-33543 #
DELET-TR-78-5 ..... N78-33167 #

DELNV-TR-78-2 ..... N78-33432 #

DHEW/PUB/FDA-78/8062 ..... N78-33725 #

DLR-FB-77-34 ..... N78-33042*#

DNA-4392T ..... N78-33342 #
DNA-4486F ..... N78-33659 #
DNA-4507F ..... N78-33128 #

DOC-78SDS4238 ..... N78-33506*#

DOE/CS-0018/6 ..... N78-33548 #
DOE/EDP-23 ..... N78-33518 #
DOE/EDP-0002 ..... N78-33568 #
DOE/EDP-0015 ..... N78-33579 #
DOE/EDP-0016 ..... N78-33554 #
DOE/EDP-0017 ..... N78-33555 #
DOE/EDP-0018 ..... N78-33556 #
DOE/EDP-0020 ..... N78-33622 #
DOE/ER-0005/D ..... N78-33557 #
DOE/ET-0023/1 ..... N78-33594 #
DOE/EV-0008/1 ..... N78-33626 #
DOE/JPL-954328-78/2 ..... N78-33535*#
DOE/JPL-954350-78/3 ..... N78-33265*#
DOE/JPL-954693-78/1 ..... N78-33536*#
DOE/JPL-954698-78/1 ..... N78-33533*#
DOE/JPL-954848-78/1 ..... N78-33534*#
DOE/RA-0003/1-VOL-1 ..... N78-33563 #
DOE/RA-0003/2-VOL-2 ..... N78-33564 #
DOE/US-0001/1 ..... N78-33256 #

DOT-HS-803-275 ..... N78-33455 #
DOT-HS-803-276 ..... N78-33456 #
DOT-HS-803-277 ..... N78-33457 #
DOT-HS-803-278 ..... N78-33458 #
DOT-HS-803-279 ..... N78-33459 #

DOT-TSC-NHTSA-78-2 ..... N78-33455 #
DOT-TSC-NHTSA-78-3 ..... N78-33456 #
DOT-TSC-NHTSA-78-4 ..... N78-33457 #
DOT-TSC-NHTSA-78-5 ..... N78-33458 #
DOT-TSC-NHTSA-78-5 ..... N78-33459 #

DOT-TSC-RSPD-78-8.1 ..... N78-34011 #
DOT-TSC-RSPD-78-8.2 ..... N78-34012 #

DOT-TSC-UMTA-77-41 ..... N78-34010 #

DP-MS-77-101 ..... N78-33517 #

DPT-HS-803-311-VOL-3 ..... N78-33125 #

DRDMI-T-CR-78-10 ..... N78-33390 #

DTNSRDC-ASED-383 ..... N78-33049 #

DW9-30 ..... N78-33484 #

D6-46317 ..... N78-33088 #

E-8994 ..... N78-33107*#
E-9005 ..... N78-33109*#
E-9302 ..... N78-33108*#
E-9464 ..... N78-33110*#
E-9533 ..... N78-33196*#
E-9560 ..... N78-33137*#
E-9653 ..... N78-33618*#
E-9687 ..... N78-33447*#
E-9711 ..... N78-33510*#
E-9718 ..... N78-33380*#
E-9733 ..... N78-33149*#
E-9759 ..... N78-33150*#
E-9766 ..... N78-33445*#
E-9768 ..... N78-33283*#
E-9784 ..... N78-33151*#
E-9793 ..... N78-33102*#

ECOM-77-0146-1 ..... N78-33301 #
ECOM-77-2644-F ..... N78-33540 #
ECOM-77-2684-1 ..... N78-33345 #

EM-78-3 ..... N78-33296 #

EMD-78-48 ..... N78-33521 #
EMD-78-60 ..... N78-33996 #
EMD-78-62 ..... N78-33607 #

EPA-530/SW-163C-1 ..... N78-33270 #
EPA-530/SW-163C-2 ..... N78-33271 #
EPA-530/SW-163C-3 ..... N78-33272 #
EPA-530/SW-163C-4 ..... N78-33273 #
EPA-600/2-78-066 ..... N78-33631 #
EPA-600/2-78-067 ..... N78-33630 #
EPA-600/3-78-028 ..... N78-33633 #
EPA-600/3-78-030 ..... N78-33697 #
EPA-600/4-78-002 ..... N78-33635 #
EPA-600/4-78-013 ..... N78-33627 #
EPA-600/7-78-05 ..... N78-33637 #
EPA-600/7-78-014 ..... N78-33672 #
EPA-600/7-78-063 ..... N78-33636 #
EPA-600/7-78-100 ..... N78-33638 #

EPRI-AF-684 ..... N78-33391 #
EPRI-AF-689 ..... N78-33175 #

EPRI-EA-504 ..... N78-33547 #

EPRI-EM-624 ..... N78-33214 #
EPRI-EM-661 ..... N78-33577 #
EPRI-EM-696-VOL-1 ..... N78-33576 #
EPRI-EM-696-VOL-2 ..... N78-34008 #
EPRI-EM-711 ..... N78-33590 #

EPRI-ER-652 ..... N78-33587 #
EPRI-ER-712 ..... N78-33574 #

EPRI-NP-701-SR ..... N78-33489 #
EPRI-NP-705 ..... N78-33801 #
EPRI-NP-744 ..... N78-33469 #

ERADCOM/ASL-CR-78-0013-1 ..... N78-33662 #
ERADCOM/ASL-CR-78-0127-1 ..... N78-33429 #
ERADCOM/ASL-TR-0005 ..... N78-33657 #
ERADCOM/ASL-TR-0006 ..... N78-33656 #
ERADCOM/ASL-TR-0008 ..... N78-33682 #
ERADCOM/ASL-TR-0009 ..... N78-33621 #

ERDA-77-80 ..... N78-33597 #

ESD-TR-77-362 ..... N78-33514 #
ESD-TR-78-29 ..... N78-33426 #
ESD-TR-78-114 ..... N78-33131 #
ESD-TR-78-132 ..... N78-33977 #

ESL-TH-820 ..... N78-33822 #
ESL-TH-824 ..... N78-33298 #
ESL-TH-825 ..... N78-33812 #

ESL-784685-4 ..... N78-33311 #

E78-10155 ..... N78-33505*#
E78-10156 ..... N78-33506*#
E78-10157 ..... N78-33507*#
E78-10175 ..... N78-33508*#

FAA-AM-78-24 ..... N78-33737 #

FAA-ED-03-1 ..... N78-33073 #
FAA-ED-18-3 ..... N78-33119 #

FAA-EM-78-5-VOL-1 ..... N78-33072 #
FAA-EM-78-8A ..... N78-33068 #
FAA-EM-78-11 ..... N78-33062 #

FAA-NA-77-18 ..... N78-33655 #
FAA-NA-77-20 ..... N78-33291 #
FAA-NA-78-2 ..... N78-33290 #
FAA-NA-78-5 ..... N78-33063 #
FAA-NA-78-12 ..... N78-33069 #
FAA-NA-78-23 ..... N78-33071 #

FAA-RD-77-12,4 ..... N78-33070 #
FAA-RD-77-165 ..... N78-33106 #
FAA-RD-78-10 ..... N78-33105 #
FAA-RD-78-23 ..... N78-33071 #
FAA-RD-78-30-1-VOL-1 ..... N78-33074 #
FAA-RD-78-30-2-VOL-2 ..... N78-33075 #
FAA-RD-78-30-3-VOL-3 ..... N78-33076 #
FAA-RD-78-36 ..... N78-33615 #
FAA-RD-78-39 ..... N78-33655 #
FAA-RD-78-48 ..... N78-33290 #
FAA-RD-78-55 ..... N78-33063 #
FAA-RD-78-75 ..... N78-33291 #
FAA-RD-78-76 ..... N78-33069 #

FCC/OCE/LAB-78-02 ..... N78-33318 #

FCM-78-2 ..... N78-33689 #

FDA/BRH-78/99 ..... N78-33725 #

FE-2326-20 ..... N78-33210 #
FE-2446-4 ..... N78-33398 #
FE-2468-26 ..... N78-33985 #
FE-2786-12 ..... N78-33243 #

FEA/D-77/039 ..... N78-33549 #

FHWA/PL-78/006 ..... N78-34009 #

FIS-77-4007-VOL-2 ..... N78-33286*#

FMRC-22405 ..... N78-33631 #

FP2-E-034-ADD ..... N78-33070 #

FR-ERU-4920 ..... N78-33686 #

G-7802-17 ..... N78-33424*#

GA-A-14608 ..... N78-33221 #

GEPP-372 ..... N78-33176 #

GJBX-13-78 ..... N78-33519 #

GL-2748 ..... N78-33348 #

G7802-F16 ..... N78-33499*#

H-1003 ..... N78-33054*#
H-1035 ..... N78-33053*#

HCP/M50217-01 ..... N78-33591 #
HCP/M60172-01/2 ..... N78-33551 #
HCP/T0285-02 ..... N78-33598 #
HCP/T1830-03 ..... N78-33706 #

HCP/T2552-01 ..... N78-33667 #
HCP/T7405-1 ..... N78-33582 #

HEDL-TME-78-15 ..... N78-33180 #

HIG-CONTRIB-889 ..... N78-33409 #

HONEYWELL-78SRC10-VOL-1 ..... N78-33081 #
HONEYWELL-78SRC10-VOL-2 ..... N78-33082 #

IAEA-SM-229/65 ..... N78-33721 #

IIHR-210 ..... N78-33057 #

INPE-1186-NTE/109 ..... N78-33507*#

IR-14 ..... N78-33481*#
IR-1978-2 ..... N78-33288*#

IS-J-801 ..... N78-33178 #
IS-T-806 ..... N78-33179 #

ISBN-0-309-02737-3 ..... N78-33207*#
ISBN-0-7988-1287-7 ..... N78-33509*#
ISBN-0-7988-1331-8 ..... N78-33183 #
ISBN-0-8444-0271-0 ..... N78-33983 #
ISBN-0-905984-06-4 ..... N78-34001 #

ISSN-0160-9742 ..... N78-33983 #
ISSN-0568-0581 ..... N78-33653*#

ITR-13 ..... N78-33932 #

JPL-PUB-77-26-REV-2 ..... N78-33789*#
JPL-PUB-78-44 ..... N78-34022*#
JPL-PUB-78-81 ..... N78-33645*#
JPL-PUB-78-90 ..... N78-33716*#
JPL-PUB-78-93 ..... N78-34007*#

JPRS-71896 ..... N78-34028 #
JPRS-71910 ..... N78-33727 #

K-1894 ..... N78-33220 #

K/CSD/INF-78/15 ..... N78-33393 #

KU-FRL-322-1 ..... N78-33444*#

L-11900 ..... N78-33791*#
L-11927 ..... N78-33617*#
L-11950 ..... N78-33385*#
L-12043 ..... N78-33776*#
L-12057 ..... N78-33050*#
L-12069 ..... N78-33230*#
L-12182 ..... N78-33135*#
L-12210 ..... N78-33873*#
L-12283 ..... N78-33051*#
L-12298 ..... N78-33616*#
L-12455 ..... N78-33152*#

LA-UR-78-532 ..... N78-33392 #
LA-UR-78-547 ..... N78-33396 #
LA-UR-78-689 ..... N78-33625 #
LA-UR-78-706 ..... N78-33559 #
LA-UR-78-824 ..... N78-33415 #
LA-UR-78-1052 ..... N78-33586 #
LA-UR-78-1063 ..... N78-33721 #
LA-UR-78-1150 ..... N78-33623 #

LA-6689-MS ..... N78-33558 #
LA-6959-MS ..... N78-33418 #
LA-7202-MS ..... N78-33394 #
LA-7219-MS ..... N78-33572 #
LA-7227-MS ..... N78-33900 #

LAPS-11B ..... N78-33941 #

LBL-6807 ..... N78-33258 #
LBL-6881 ..... N78-33260 #
LBL-6884 ..... N78-33216 #
LBL-6899 ..... N78-33181 #
LBL-7397 ..... N78-33223 #
LBL-7516 ..... N78-33798 #

LC-73-60019 ..... N78-33400 #
LC-77-95193 ..... N78-33207*#
LC-78-12977 ..... N78-33983 #

LCD-78-115 ..... N78-33997 #

LERC-78/1 ..... N78-33552 #

LHNCBC-78-03 ..... N78-33998 #

LMSC-HREC-TR-D568366 ..... N78-33134*#

LR-28272-VOL-1 ..... N78-33483 #
LR-28705 ..... N78-33086*#

LTP-23 ..... N78-33426 #

MAN-1031 ..... N78-33615 #

MDC-G-6776-VOL-2 ..... N78-33571 #

MDC-J7908-PT-2 ..... N78-33449 #

MIE-027 ..... N78-33482 #

MIRADCOM-TG-CR-77-1-VOL-2 ..... N78-33451 #

MLM-2500 ..... N78-33940 #

MRC-R-340 ..... N78-33317 #

MRC/SD-R-8 ..... N78-33342 #

MRL-KV-78-1 ..... N78-33969 #

MTP-6-1-006-3 ..... N78-33294 #

MTPR-6 ..... N78-33243 #

MTR-3057 ..... N78-33131 #
MTR-3315 ..... N78-33514 #
MTR-7672 ..... N78-33998 #
MTR-7766-REV-1 ..... N78-33068 #

NADC-77328-60 ..... N78-33197 #
NADC-78028-60 ..... N78-33619 #

NAMRL-MONOGRAPH-23 ..... N78-33099 #

NASA-CASE-ARC-11114-1 ..... N78-33717*#

NASA-CASE-LAR-12195-1 ..... N78-33446*#
NASA-CASE-LAR-12269-1 ..... N78-33123*#
NASA-CASE-LAR-12344-1 ..... N78-33511*#

NASA-CASE-LEW-12496-1 ..... N78-33101*

NASA-CASE-NPO-88351 ..... N78-33228*
NASA-CASE-NPO-10233-1 ..... N78-33913*+
NASA-CASE-NPO-13763-1 ..... N78-33526*
NASA-CASE-NPO-14247-1 ..... N78-33715*#
NASA-CASE-NPO-14272-1 ..... N78-33164*#

NASA-CP-2055 ..... N78-33776*#

NASA-CR-3019 ..... N78-33386*#
NASA-CR-15775 ..... N78-33382*#
NASA-CR-15779 ..... N78-33693*#
NASA-CR-134804 ..... N78-33527*#
NASA-CR-134953 ..... N78-33103*#
NASA-CR-135450 ..... N78-33463*#
NASA-CR-137591 ..... N78-33127*#
NASA-CR-144877 ..... N78-33444*#
NASA-CR-150784 ..... N78-33532*#
NASA-CR-150787 ..... N78-33529*#
NASA-CR-150795 ..... N78-33531*#
NASA-CR-150802 ..... N78-33528*#
NASA-CR-150806 ..... N78-33530*#
NASA-CR-150821 ..... N78-33341*#
NASA-CR-150822 ..... N78-33142*#
NASA-CR-150823 ..... N78-34024*#
NASA-CR-150824 ..... N78-33383*#
NASA-CR-150826 ..... N78-33134*#
NASA-CR-151959 ..... N78-33085*#
NASA-CR-152109 ..... N78-33113*#
NASA-CR-152110 ..... N78-33114*#
NASA-CR-152111 ..... N78-33115*#
NASA-CR-152112 ..... N78-33116*#
NASA-CR-152113 ..... N78-33117*#
NASA-CR-152114 ..... N78-33118*#
NASA-CR-152183 ..... N78-33379*#
NASA-CR-152188 ..... N78-33384*#
NASA-CR-152196 ..... N78-33876*#
NASA-CR-156779 ..... N78-34023*#
NASA-CR-156808 ..... N78-33286*#
NASA-CR-156815 ..... N78-33505*#
NASA-CR-156818 ..... N78-33506*#
NASA-CR-156825 ..... N78-33646*#
NASA-CR-156830 ..... N78-33702*#
NASA-CR-156833 ..... N78-33340*#
NASA-CR-156834 ..... N78-33654*#
NASA-CR-156836 ..... N78-33425*#
NASA-CR-156841 ..... N78-33288*#
NASA-CR-156842 ..... N78-34025*#
NASA-CR-156843 ..... N78-33513*#
NASA-CR-156846 ..... N78-33539*#
NASA-CR-156848 ..... N78-33287*#
NASA-CR-157268 ..... N78-33507*#
NASA-CR-157270 ..... N78-33508*#
NASA-CR-157728 ..... N78-33435*#
NASA-CR-157735 ..... N78-33387*#
NASA-CR-157741 ..... N78-33914*#
NASA-CR-157742 ..... N78-34020*#
NASA-CR-157743 ..... N78-34006*#
NASA-CR-157744 ..... N78-33251*#
NASA-CR-157745 ..... N78-33048*#
NASA-CR-157746 ..... N78-33194*#
NASA-CR-157757 ..... N78-34019*#
NASA-CR-157758 ..... N78-33535*#
NASA-CR-157759 ..... N78-33265*#
NASA-CR-157760 ..... N78-33536*#
NASA-CR-157761 ..... N78-33644*#
NASA-CR-157762 ..... N78-33788*#
NASA-CR-157763 ..... N78-34007*#
NASA-CR-157764 ..... N78-34022*#
NASA-CR-157765 ..... N78-33645*#
NASA-CR-157766 ..... N78-33789*#
NASA-CR-157767 ..... N78-33195*#
NASA-CR-157768 ..... N78-34015*#
NASA-CR-157769 ..... N78-33481*#
NASA-CR-157770 ..... N78-33653*#
NASA-CR-157771 ..... N78-33381*#
NASA-CR-157772 ..... N78-33534*#
NASA-CR-157774 ..... N78-33533*#
NASA-CR-157775 ..... N78-33266*#
NASA-CR-157776 ..... N78-33716*#
NASA-CR-157777 ..... N78-33405*#
NASA-CR-157786 ..... N78-33509*#
NASA-CR-157789 ..... N78-33207*#
NASA-CR-158917 ..... N78-33406*#
NASA-CR-158921 ..... N78-33148*#
NASA-CR-158935 ..... N78-33086*#
NASA-CR-158944 ..... N78-33479*#
NASA-CR-158958 ..... N78-33087*#
NASA-CR-159399 ..... N78-33537*#
NASA-CR-159415 ..... N78-33104*#
NASA-CR-159430 ..... N78-33044*#
NASA-CR-159433 ..... N78-33478*#

NASA-NEWS-RELEASE-78-165 ..... N78-33130*

NASA-RP-1019 ..... N78-33791*#

NASA-SP-7037(100) ..... N78-33035*+

NASA-TM-X-62299 ..... N78-33289*#

NASA-TM-73280 ..... N78-33696*#
NASA-TM-75106 ..... N78-33710*+
NASA-TM-75325 ..... N78-33041*#
NASA-TM-75333 ..... N78-33915*#
NASA-TM-75445 ..... N78-33042*#
NASA-TM-75453 ..... N78-33338*#
NASA-TM-75461 ..... N78-33703*#
NASA-TM-75548 ..... N78-33642*#
NASA-TM-75576 ..... N78-33643*+
NASA-TM-75577 ..... N78-33140*+
NASA-TM-75578 ..... N78-34017*+
NASA-TM-75579 ..... N78-33713*+
NASA-TM-78449 ..... N78-33043*#
NASA-TM-78507 ..... N78-34014*#
NASA-TM-78510 ..... N78-34021*#
NASA-TM-78687 ..... N78-33480*#
NASA-TM-78719 ..... N78-33152*#
NASA-TM-78724 ..... N78-33060*#
NASA-TM-78736 ..... N78-33873*#
NASA-TM-78748 ..... N78-33731*#
NASA-TM-78755 ..... N78-33230*#
NASA-TM-78769 ..... N78-33874*#
NASA-TM-78774 ..... N78-33061*#
NASA-TM-78780 ..... N78-33045*#
NASA-TM-78781 ..... N78-33046*#
NASA-TM-78782 ..... N78-33407*#

NASA-TM-78783 ..... N78-33153*#
NASA-TM-78785 ..... N78-33875*#
NASA-TM-78787 ..... N78-33047*#
NASA-TM-78789 ..... N78-33538*#
NASA-TM-78959 ..... N78-33510*#
NASA-TM-78981 ..... N78-33150*#
NASA-TM-78985 ..... N78-33149*#
NASA-TM-78987 ..... N78-33445*#
NASA-TM-78992 ..... N78-33283*#
NASA-TM-79000 ..... N78-33151*#
NASA-TM-79009 ..... N78-33102*#
NASA-TM-79010 ..... N78-33380*#
NASA-TM-79568 ..... N78-33512*#
NASA-TM-79596 ..... N78-33424*#
NASA-TM-79606 ..... N78-33284*#
NASA-TM-79627 ..... N78-33647*#
NASA-TM-79633 ..... N78-33339*#
NASA-TM-79646 ..... N78-34013*#
NASA-TM-79647 ..... N78-34027*#
NASA-TM-79658 ..... N78-34026*#
NASA-TM-79847 ..... N78-33096*#

NASA-TP-1176 ..... N78-33385*#
NASA-TP-1270 ..... N78-33051*#
NASA-TP-1275 ..... N78-33617*#
NASA-TP-1291 ..... N78-33050*#
NASA-TP-1292 ..... N78-33616*#
NASA-TP-1295 ..... N78-33110*#
NASA-TP-1298 ..... N78-33107*#
NASA-TP-1305 ..... N78-33135*#
NASA-TP-1314 ..... N78-33109*#
NASA-TP-1327 ..... N78-33499*#
NASA-TP-1331 ..... N78-33053*#
NASA-TP-1336 ..... N78-33054*#
NASA-TP-1337 ..... N78-33108*#
NASA-TP-1340 ..... N78-33618*#
NASA-TP-1341 ..... N78-33196*#
NASA-TP-1342 ..... N78-33447*#
NASA-TP-1344 ..... N78-33137*#

NBS-GCR-78-126 ..... N78-33184 #

NBS-SP-467 ..... N78-34000 #
NBS-SP-497 ..... N78-33400 #
NBS-SP-498 ..... N78-34000 #

NBS-SPECIAL-PUB-500-35 ..... N78-33762 #

NBS-TN-1001 ..... N78-33438 #
NBS-TN-1005 ..... N78-33276 #

NBSIR-78-884 ..... N78-33225 #
NBSIR-78-1428 ..... N78-33629 #
NBSIR-78-1474 ..... N78-33360 #
NBSIR-78-1487 ..... N78-33761 #

NCAR-CT-48 ..... N78-33685 #

NEAR-TR-171 ..... N78-33876*#

NEPRF-TN-77-01 ..... N78-33755 #

NIH-DCRT-DMB-SSS-AN506 ..... N78-33979 #

NIH-DCRT-DMB-SSS-UG104 ..... N78-33980 #

NIH/DF-78/003A ..... N78-33980 #
NIH/DF-78/003B ..... N78-33979 #

NLM/LHC-CR-1801 ..... N78-33998 #

NOAA-DE-ERL-APCL-1 ..... N78-33693*#

NOAA-NWSTM-PR-18 ..... N78-33691 #

NOAA-TM-ERL-PMEL-11 ..... N78-33409 #

NOAA-TM-NESS-91 ..... N78-33133 #

NOAA-TM-NOS-NGS-12 ..... N78-33668 #

NOAA-TR-ERL-394-NHEML-1 ..... N78-33690 #

NOAA-78042003 ..... N78-33687 #
NOAA-78042004 ..... N78-33692 #
NOAA-78042703 ..... N78-33693*#
NOAA-78050302 ..... N78-33690 #
NOAA-78050804 ..... N78-33133 #
NOAA-78051201 ..... N78-33698 #

NOAA-78051501 ..... N78-33691 #
NOAA-78051505 ..... N78-33668 #
NOAA-78051601 ..... N78-33689 #
NOAA-78052302 ..... N78-33688 #

NOR-77-162 ..... N78-33736 #

NORSAR-SCIENTIFIC-2-77/78 ..... N78-33658 #

NOSC-TR-246-VOL-1 ..... N78-33077 #
NOSC-TR-246-VOL-2 ..... N78-33078 #
NOSC-TR-246-VOL-3 ..... N78-33079 #
NOSC-TR-246-VOL-4 ..... N78-33080 #

NPS52-78-001 ..... N78-33098 #
NPS69-78-009 ..... N78-33111 #

NRL-MR-3668 ..... N78-33835 #
NRL-MR-3733 ..... N78-33907 #
NRL-MR-3757 ..... N78-33293 #

NSF/IDOE-78-43 ..... N78-33699 #
NSF/RA-770354 ..... N78-33319 #
NSF/RA-770464 ..... N78-33757 #
NSF/RA-770476 ..... N78-33842 #
NSF/RA-770477 ..... N78-33844 #
NSF/RA-770478 ..... N78-33843 #
NSF/RA-770479 ..... N78-33759 #
NSF/RA-770480 ..... N78-33760 #
NSF/RA-770482 ..... N78-33268 #
NSF/RA-780031 ..... N78-33670 #
NSF/RA-780032 ..... N78-33671 #
NSF/RA-780034 ..... N78-33684 #

NSRDS-NBS-60 ..... N78-33901 #

NSWC/DL-TR-3808 ..... N78-33132 #
NSWC/WOL/TR-76-116-PT-2 ..... N78-33254 #
NSWC/WOL/TR-77-163 ..... N78-33433 #
NSWC/WOL/TR-78-39 ..... N78-33199 #
NSWC/WOL/TR-78-63 ..... N78-33544 #

NTIS/PS-74/106 ..... N78-33634 #
NTIS/PS-74/116 ..... N78-33974 #
NTIS/PS-74/120 ..... N78-33439 #
NTIS/PS-75-467 ..... N78-33498 #
NTIS/PS-75/075 ..... N78-33922 #
NTIS/PS-75/236 ..... N78-33724 #
NTIS/PS-75/415 ..... N78-33362 #
NTIS/PS-75/420 ..... N78-33919 #
NTIS/PS-75/432 ..... N78-33885 #
NTIS/PS-75/437 ..... N78-33764 #
NTIS/PS-75/458 ..... N78-33363 #
NTIS/PS-75/459 ..... N78-33322 #
NTIS/PS-75/471 ..... N78-33603 #
NTIS/PS-75/472 ..... N78-33605 #
NTIS/PS-75/473 ..... N78-33440 #
NTIS/PS-75/497 ..... N78-33402 #
NTIS/PS-75/501 ..... N78-33806 #
NTIS/PS-75/508 ..... N78-33707 #
NTIS/PS-75/525 ..... N78-33700 #
NTIS/PS-75/530 ..... N78-33639 #
NTIS/PS-75/539 ..... N78-33439 #
NTIS/PS-75/544 ..... N78-33634 #
NTIS/PS-75/554 ..... N78-33246 #
NTIS/PS-75/569 ..... N78-33247 #
NTIS/PS-75/584 ..... N78-33185 #
NTIS/PS-75/591 ..... N78-33974 #
NTIS/PS-75/629 ..... N78-33726 #
NTIS/PS-75/643 ..... N78-33404 #
NTIS/PS-75/764 ..... N78-33462 #
NTIS/PS-76/0440 ..... N78-33885 #
NTIS/PS-76/0441 ..... N78-33886 #
NTIS/PS-76/0465 ..... N78-33884 #
NTIS/PS-76/0490 ..... N78-33919 #
NTIS/PS-76/0492 ..... N78-33921 #
NTIS/PS-76/0520 ..... N78-33363 #
NTIS/PS-76/0526 ..... N78-33724 #
NTIS/PS-76/0532 ..... N78-33362 #
NTIS/PS-76/0533 ..... N78-33402 #
NTIS/PS-76/0538 ..... N78-33066 #
NTIS/PS-76/0539 ..... N78-33922 #
NTIS/PS-76/0543 ..... N78-33603 #
NTIS/PS-76/0544 ..... N78-33604 #
NTIS/PS-76/0549 ..... N78-33605 #
NTIS/PS-76/0550 ..... N78-33606 #
NTIS/PS-76/0551 ..... N78-33806 #
NTIS/PS-76/0553 ..... N78-33322 #

NTIS/PS-76/0554 ..... N78-33498 #
NTIS/PS-76/0557 ..... N78-33707 #
NTIS/PS-76/0562 ..... N78-33764 #
NTIS/PS-76/0563 ..... N78-33765 #
NTIS/PS-76/0585 ..... N78-33634 #
NTIS/PS-76/0589 ..... N78-33440 #
NTIS/PS-76/0590 ..... N78-33246 #
NTIS/PS-76/0614 ..... N78-33439 #
NTIS/PS-76/0625 ..... N78-33639 #
NTIS/PS-76/0628 ..... N78-33247 #
NTIS/PS-76/0629 ..... N78-33700 #
NTIS/PS-76/0635 ..... N78-33694 #
NTIS/PS-76/0678 ..... N78-33185 #
NTIS/PS-76/0679 ..... N78-33726 #
NTIS/PS-76/0681 ..... N78-33974 #
NTIS/PS-76/0724 ..... N78-33462 #
NTIS/PS-76/0726 ..... N78-33461 #
NTIS/PS-76/0740 ..... N78-33404 #
NTIS/PS-77/0551 ..... N78-33602 #
NTIS/PS-77/0552 ..... N78-33600 #
NTIS/PS-77/0561 ..... N78-33881 #
NTIS/PS-77/0562 ..... N78-33882 #
NTIS/PS-77/0563 ..... N78-33883 #
NTIS/PS-77/0565 ..... N78-33884 #
NTIS/PS-77/0578 ..... N78-33885 #
NTIS/PS-77/0579 ..... N78-33886 #
NTIS/PS-77/0581 ..... N78-33919 #
NTIS/PS-77/0582 ..... N78-33921 #
NTIS/PS-77/0593 ..... N78-33363 #
NTIS/PS-77/0596 ..... N78-33402 #
NTIS/PS-77/0599 ..... N78-33362 #
NTIS/PS-77/0600 ..... N78-33724 #
NTIS/PS-77/0606 ..... N78-33066 #
NTIS/PS-77/0619 ..... N78-33707 #
NTIS/PS-77/0620 ..... N78-33262 #
NTIS/PS-77/0621 ..... N78-33263 #
NTIS/PS-77/0625 ..... N78-33322 #
NTIS/PS-77/0626 ..... N78-33922 #
NTIS/PS-77/0629 ..... N78-33764 #
NTIS/PS-77/0630 ..... N78-33765 #
NTIS/PS-77/0632 ..... N78-33806 #
NTIS/PS-77/0633 ..... N78-33605 #
NTIS/PS-77/0634 ..... N78-33606 #
NTIS/PS-77/0638 ..... N78-33603 #
NTIS/PS-77/0639 ..... N78-33604 #
NTIS/PS-77/0645 ..... N78-33498 #
NTIS/PS-77/0653 ..... N78-33634 #
NTIS/PS-77/0677 ..... N78-33523 #
NTIS/PS-77/0704 ..... N78-33639 #
NTIS/PS-77/0705 ..... N78-33246 #
NTIS/PS-77/0710 ..... N78-33440 #
NTIS/PS-77/0712 ..... N78-33361 #
NTIS/PS-77/0718 ..... N78-33247 #
NTIS/PS-77/0719 ..... N78-33700 #
NTIS/PS-77/0724 ..... N78-33439 #
NTIS/PS-77/0739 ..... N78-33185 #
NTIS/PS-77/0744 ..... N78-33974 #
NTIS/PS-77/0757 ..... N78-33726 #
NTIS/PS-77/0766 ..... N78-33462 #
NTIS/PS-77/0767 ..... N78-33461 #
NTIS/PS-77/0798 ..... N78-33404 #
NTIS/PS-77/0799 ..... N78-33694 #
NTIS/PS-77/0800 ..... N78-33122 #
NTIS/PS-77/0801 ..... N78-33278 #
NTIS/PS-78/0660/7 ..... N78-33603 #
NTIS/PS-78/0661/5 ..... N78-33604 #
NTIS/PS-78/0664/9 ..... N78-33881 #
NTIS/PS-78/0665/6 ..... N78-33882 #
NTIS/PS-78/0666/4 ..... N78-33883 #
NTIS/PS-78/0667/2 ..... N78-33884 #
NTIS/PS-78/0670/6 ..... N78-33922 #
NTIS/PS-78/0673/0 ..... N78-33262 #
NTIS/PS-78/0674/8 ..... N78-33263 #
NTIS/PS-78/0676/3 ..... N78-33724 #
NTIS/PS-78/0678/9 ..... N78-33707 #
NTIS/PS-78/0686/2 ..... N78-33634 #
NTIS/PS-78/0688/8 ..... N78-33806 #
NTIS/PS-78/0689/6 ..... N78-33605 #
NTIS/PS-78/0690/4 ..... N78-33606 #
NTIS/PS-78/0694/6 ..... N78-33066 #
NTIS/PS-78/0700/1 ..... N78-33885 #
NTIS/PS-78/0701/9 ..... N78-33886 #
NTIS/PS-78/0707/6 ..... N78-33599 #
NTIS/PS-78/0708/4 ..... N78-33600 #
NTIS/PS-78/0709/2 ..... N78-33601 #
NTIS/PS-78/0710/0 ..... N78-33602 #
NTIS/PS-78/0712 ..... N78-33275 #
NTIS/PS-78/0713/8 ..... N78-33918 #
NTIS/PS-78/0714/2 ..... N78-33919 #
NTIS/PS-78/0715/9 ..... N78-33920 #
NTIS/PS-78/0716/7 ..... N78-33921 #
NTIS/PS-78/0718/3 ..... N78-33322 #
NTIS/PS-78/0722/5 ..... N78-33185 #
NTIS/PS-78/0730/8 ..... N78-33402 #
NTIS/PS-78/0736/5 ..... N78-33362 #
NTIS/PS-78/0738/1 ..... N78-33363 #
NTIS/PS-78/0754/8 ..... N78-33247 #
NTIS/PS-78/0767/0 ..... N78-33974 #
NTIS/PS-78/0768/8 ..... N78-33498 #
NTIS/PS-78/0775/3 ..... N78-33694 #
NTIS/PS-78/0792/8 ..... N78-33523 #
NTIS/PS-78/0807/4 ..... N78-33639 #
NTIS/PS-78/0808/2 ..... N78-33441 #
NTIS/PS-78/0809/0 ..... N78-33122 #
NTIS/PS-78/0810/8 ..... N78-33278 #
NTIS/PS-78/0822/3 ..... N78-33361 #
NTIS/PS-78/0823/1 ..... N78-33403 #
NTIS/PS-78/0824/9 ..... N78-33404 #
NTIS/PS-78/0839/7 ..... N78-33609 #
NTIS/PS-78/0841/3 ..... N78-33610 #
NTIS/PS-78/0842/1 ..... N78-33608 #
NTIS/PS-78/0844/7 ..... N78-33700 #
NTIS/PS-78/0859/5 ..... N78-33763 #
NTIS/PS-78/0860/3 ..... N78-33764 #
NTIS/PS-78/0861/1 ..... N78-33765 #
NTIS/PS-78/0865/2 ..... N78-33246 #
NTIS/PS-78/0866/0 ..... N78-33726 #
NTIS/PS-78/0872/8 ..... N78-33439 #
NTIS/PS-78/0896/7 ..... N78-33440 #
NTIS/PS-78/0903/1 ..... N78-33462 #
NTIS/PS-78/0904-VOL-2 ..... N78-33460 #
NTIS/PS-78/0905/6 ..... N78-33461 #

NTSB-ARC-78-1 ..... N78-33065 #

NTSB-ARG-78-1 ..... N78-33064 #

NUREG-CR-0078 ..... N78-33497 #
NUREG-CR-0135 ..... N78-33470 #

NUSC-TM-781065 ..... N78-33813 #

ONERA-TP-1977-54 ..... N78-33041*#

ORAU/IEA-78-6(M) ..... N78-33550 #

ORNL-5313 ..... N78-33219 #
ORNL-5410 ..... N78-33215 #

ORNL/CON-15 ..... N78-33570 #
ORNL/MIT-265 ..... N78-33705 #
ORNL/NUREG/TM-166 ..... N78-33208 #
ORNL/SUB-78/14233/1 ..... N78-33578 #
ORNL/TM-6170 ..... N78-33490 #
ORNL/TM-6215 ..... N78-33942 #
ORNL/TM-6273 ..... N78-33938 #
ORNL/TM-6282 ..... N78-33206 #
ORNL/TR-4610 ..... N78-33939 #

ORO-4044-7 ..... N78-33218 #
ORO-5123-1 ..... N78-33583 #

OTR-78-143 ..... N78-33995 #
OTR-78-145 ..... N78-33324 #

OWRT-A-091-MO(3) ..... N78-33182 #

PADL/ADM-01 ..... N78-33757 #
PADL/SD-01 ..... N78-33758 #
PADL/SD-02 ..... N78-33759 #
PADL/SD-10 ..... N78-33760 #

PAPER-77-051 ..... N78-33915*#

PB-264014 ..... N78-34000 #
PB-280938/2 ..... N78-33320 #
PB-280939/0 ..... N78-33321 #
PB-280980/4 ..... N78-33245 #
PB-280995/2 ..... N78-33264 #
PB-281023/2 ..... N78-33672 #
PB-281079/4 ..... N78-33684 #
PB-281083/6 ..... N78-33628 #
PB-281087/7 ..... N78-34010 #
PB-281090/1 ..... N78-33631 #
PB-281101/6 ..... N78-34009 #
PB-281140/4 ..... N78-33685 #
PB-281160/2 ..... N78-33686 #
PB-281172/7 ..... N78-33318 #

PB-281186/7 ..... N78-33723 #
PB-281212/1 ..... N78-33699 #
PB-281265/9 ..... N78-33607 #
PB-281269/1 ..... N78-33996 #
PB-281275/8 ..... N78-33633 #
PB-281306/1 ..... N78-33627 #
PB-281311/1 ..... N78-33274 #
PB-281327/7 ..... N78-33522 #
PB-281329/3 ..... N78-33065 #
PB-281330/1 ..... N78-33064 #
PB-281373/1 ..... N78-33979 #
PB-281374/9 ..... N78-33980 #
PB-281376/4 ..... N78-33802 #
PB-281377/2 ..... N78-33803 #
PB-281378/0 ..... N78-33804 #
PB-281379/8 ..... N78-33805 #
PB-281384/8 ..... N78-34011 #
PB-281385/5 ..... N78-34012 #
PB-281451/5 ..... N78-33184 #
PB-281465/5 ..... N78-33276 #
PB-281475/4 ..... N78-33744 #
PB-281500/9 ..... N78-33182 #
PB-281501/7 ..... N78-33400 #
PB-281535/5 ..... N78-33844 #
PB-281542/1 ..... N78-33438 #
PB-281545/4 ..... N78-33995 #
PB-281549/6 ..... N78-33757 #
PB-281550/4 ..... N78-33758 #
PB-281551/2 ..... N78-33759 #
PB-281552/0 ..... N78-33760 #
PB-281573/6 ..... N78-33843 #
PB-281613/0 ..... N78-33842 #
PB-281631/2 ..... N78-33697 #
PB-281639/5 ..... N78-33319 #
PB-281684/1 ..... N78-33669 #
PB-281706/2 ..... N78-33183 #
PB-281720/3 ..... N78-33991 #
PB-281721/1 ..... N78-33992 #
PB-281723/7 ..... N78-33360 #
PB-281725/2 ..... N78-33629 #
PB-281759/1 ..... N78-33401 #
PB-281768/2 ..... N78-33997 #
PB-281769/0 ..... N78-33521 #
PB-281774/0 ..... N78-33455 #
PB-281775/7 ..... N78-33456 #
PB-281776/5 ..... N78-33457 #
PB-281777/3 ..... N78-33458 #
PB-281778/1 ..... N78-33459 #
PB-281782/3 ..... N78-33520 #
PB-281786/4 ..... N78-33632 #
PB-281796/3 ..... N78-33129 #
PB-281847/4 ..... N78-33986 #
PB-281848/2 ..... N78-33987 #
PB-281849/0 ..... N78-33988 #
PB-281850/8 ..... N78-33989 #
PB-281851/6 ..... N78-33990 #
PB-281853/2 ..... N78-33497 #
PB-281933/2 ..... N78-33630 #
PB-282028/0 ..... N78-33635 #
PB-282044/7 ..... N78-34000 #
PB-282050/4 ..... N78-33993 #
PB-282051/2 ..... N78-33994 #
PB-282064/5 ..... N78-33670 #
PB-282065/2 ..... N78-33671 #
PB-282067/8 ..... N78-33901 #
PB-282070/2 ..... N78-33270 #
PB-282071/0 ..... N78-33271 #
PB-282072/8 ..... N78-33272 #
PB-282073/6 ..... N78-33273 #
PB-282109/8 ..... N78-33324 #
PB-282149/4 ..... N78-33693*#
PB-282170/0 ..... N78-33470 #
PB-282234/4 ..... N78-33725 #
PB-282255/9 ..... N78-33637 #
PB-282283/1 ..... N78-33323 #
PB-282345/8 ..... N78-33999 #
PB-282402/7 ..... N78-33125 #
PB-282406/8 ..... N78-33761 #
PB-282428/2 ..... N78-33638 #
PB-282429/0 ..... N78-33636 #
PB-282444/9 ..... N78-33225 #
PB-282499/3 ..... N78-33998 #
PB-282507/3 ..... N78-33687 #
PB-282510/7 ..... N78-33762 #
PB-282589/1 ..... N78-33981 #
PB-282590/9 ..... N78-33982 #
PB-282665/9 ..... N78-33688 #
PB-282838/2 ..... N78-33689 #
PB-283078/4 ..... N78-33133 #
PB-283079/2 ..... N78-33690 #
PB-283087/5 ..... N78-33668 #
PB-283088/3 ..... N78-33691 #
PB-283163/4 ..... N78-33277 #
PB-283177/4 ..... N78-33698 #
PB-283425/7 ..... N78-33692 #

PDA-TR-1031-90-58 ..... N78-33128 #

PFR-78-040 ..... N78-33971 #

PH-78-1 ..... N78-33970 #

PMEL-CONTRIB-889 ..... N78-33409 #

PNL-2410 ..... N78-33565 #
PNL-2464 ..... N78-33545 #
PNL-2476 ..... N78-33546 #
PNL-2606 ..... N78-33211 #
PNL-2634 ..... N78-33720 #

POLY-M/AE-78-22 ..... N78-33382*#

PPG-349 ..... N78-33934 #
PPG-357 ..... N78-33354 #

PPPL-1442 ..... N78-33945 #

PR-6 ..... N78-33548 #
PR-13 ..... N78-33676 #
PR-20 ..... N78-33210 #
PR-287 ..... N78-33642*#
PR-00897 ..... N78-33349 #

PRRL-77-CR-24 ..... N78-33916 #

PSAD-78-102 ..... N78-33129 #

PSR-801 ..... N78-33665 #
PSR-806 ..... N78-33295 #

PUBL-1319-01-4-1775 ..... N78-33313 #

P78-10178 ..... N78-33130*

QPR-2 ..... N78-33497 #

QR-2 ..... N78-33582 #
QR-3 ..... N78-33259 #
QR-3 ..... N78-33569 #

R-SAG-5/78-01 ..... N78-33513*#

R-785 ..... N78-33297 #
R-787 ..... N78-33794 #
R-789 ..... N78-33165 #
R-796 ..... N78-33751 #
R-797 ..... N78-33303 #
R-1393 ..... N78-33085*#

RADC-TR-77-308 ..... N78-33916 #
RADC-TR-77-420 ..... N78-33348 #
RADC-TR-78-65 ..... N78-33310 #
RADC-TR-78-67 ..... N78-33665 #
RADC-TR-78-76 ..... N78-33346 #
RADC-TR-78-77 ..... N78-33308 #
RADC-TR-78-81 ..... N78-33352 #
RADC-TR-78-139 ..... N78-33304 #

RAND/R-2275/DCA ..... N78-33300 #

RC-6581 ..... N78-33752 #

RC76-T-47 ..... N78-33631 #

RDA-TR-0400-001-VOL-1 ..... N78-33515 #

REPT-5WWTN-78-2 ..... N78-33679 #
REPT-24 ..... N78-33649 #
REPT-25 ..... N78-33652 #
REPT-26 ..... N78-33650 #
REPT-27 ..... N78-33285 #
REPT-28 ..... N78-33648 #
REPT-29 ..... N78-33651 #
REPT-37 ..... N78-33172 #
REPT-76-H-031(061/066-1) ..... N78-33236 #
REPT-76-W-117-F ..... N78-33654*#
REPT-77S1111 ..... N78-33532*#
REPT-78-20 ..... N78-33677 #

REPT-791-40-13-01 ..... N78-33060*#
REPT-1842-EEG/EETS-TR-78-2 ..... N78-33814 #
REPT-1842EEG/EETD-TR-78-7 ..... N78-33292 #
REPT-6384-928032 ..... N78-33408 #
REPT-068670-15-P ..... N78-33676 #

RFP-2647 ..... N78-33205 #
RFP-2652 ..... N78-33238 #

RP-582 ..... N78-33052 #

RR-78-3 ..... N78-33735 #

R76AEG484-VOL-2 ..... N78-33103*#
R78-38 ..... N78-33353 #
R78AEG476 ..... N78-33463*#

S-2294 ..... N78-33352 #

SACLANTCEN-SR-107 ..... N78-33877 #

SAI-77-007-AA ..... N78-33429 #
SAI-78-529-LJ ..... N78-33941 #

SAMSO-TR-78-26- REV-A ..... N78-33344 #
SAMSO-TR-78-74-VOL-1 ..... N78-33081 #
SAMSO-TR-78-74-VOL-2 ..... N78-33082 #
SAMSO-TR-78-102 ..... N78-33136 #

SAN-1108-8/1-VOL-2 ..... N78-33571 #
SAN-1198-1 ..... N78-33553 #
SAN-1269-1-VOL-1 ..... N78-33515 #
SAN-1323-3 ..... N78-33562 #

SAND-77-0199C ..... N78-33494 #
SAND-77-1145 ..... N78-33414 #
SAND-77-1309C ..... N78-33121 #
SAND-77-1333-PT-1 ..... N78-33395 #
SAND-77-1394 ..... N78-33488 #
SAND-77-1604C ..... N78-33800 #
SAND-77-1716C ..... N78-33269 #
SAND-77-1837C ..... N78-33357 #
SAND-77-1866 ..... N78-33840 #
SAND-77-1904 ..... N78-33355 #
SAND-77-2075C ..... N78-33561 #
SAND-77-2121C ..... N78-33356 #
SAND-78-0132 ..... N78-33815 #
SAND-78-0164C ..... N78-33209 #
SAND-78-0181C ..... N78-33495 #
SAND-78-0390C ..... N78-33816 #
SAND-78-0421C ..... N78-33083 #
SAND-78-0496 ..... N78-33417 #
SAND-78-0577 ..... N78-33596 #
SAND-78-7010 ..... N78-33580 #
SAND-78-8226 ..... N78-33841 #
SAND-78-8501 ..... N78-33358 #
SAND-79-0300 ..... N78-33973 #

SAR-1 ..... N78-33301 #

SCIENTIFIC-5 ..... N78-33346 #
SCIENTIFIC-6 ..... N78-33308 #

SC5117.2TR-1 ..... N78-33231 #
SC5117.3TR-2 ..... N78-33232 #
SC5117.4TR ..... N78-33233 #
SC5117.5TR ..... N78-33234 #

SD-78-AP-0124 ..... N78-33384*#

SE-3986-1 ..... N78-33566 #

SERIAL-T-368 ..... N78-33466 #
SERIAL-T-374 ..... N78-33465 #

SIO-REF-77-28 ..... N78-33699 #
SIO-REF-77-33 ..... N78-33681 #
SIO-REF-78-3 ..... N78-33660 #

SLAC-PUB-2073 ..... N78-33975 #

SLAC-206 ..... N78-33839 #

SR-1 ..... N78-33141 #
SR-1 ..... N78-33658 #
SR-2 ..... N78-33310 #
SR-2-1/2 ..... N78-33661 #
SR-8 ..... N78-33660 #

SRL-6906 ..... N78-33468 #

SRS-22-59015-001 ..... N78-33323 #

SSL-SER-19-ISSUE-37 ..... N78-34025*#

STAN-CS-78-659 ..... N78-33839 #

STI-TR-1067-1-3 ..... N78-33125 #

SU-SEL-78-015 ..... N78-33316 #

SU-TR-6508-3 ..... N78-33316 #

SUIPR-762 ..... N78-34015*#

SWRI-RS-657 ..... N78-33237 #

SWRI-02-4268 ..... N78-33487 #

TAC-7622-VOL-1 ..... N78-33792 #
TAC-7622-VOL-2 ..... N78-33793 #

TARADCOM-TR-12347-VOL-1 ..... N78-33792 #
TARADCOM-TR-12347-VOL-2 ..... N78-33793 #
TARADCOM-TR-12351 ..... N78-33448 #

TASC-TR-1019-2 ..... N78-33055 #

TETRAT-TC-645 ..... N78-33267 #

TI-03-78-14 ..... N78-33343 #

TID-27941 ..... N78-33516 #
TID-27950 ..... N78-33573 #
TID-27953 ..... N78-33593 #
TID-28191 ..... N78-33259 #

TM-25 ..... N78-33842 #
TM-28 ..... N78-33844 #
TM-30 ..... N78-33843 #
TM-78-10 ..... N78-33387*#

TOP-6-2-559 ..... N78-33294 #
TOP-7-3-522 ..... N78-33094 #

TR-ES-781 ..... N78-33401 #

TR-1 ..... N78-33412 #
TR-2 ..... N78-33171 #
TR-2 ..... N78-33231 #
TR-3 ..... N78-33168 #
TR-3 ..... N78-33232 #
TR-4 ..... N78-33233 #
TR-5 ..... N78-33234 #
TR-8 ..... N78-33302 #
TR-12 ..... N78-33917 #
TR-16 ..... N78-33878 #
TR-19 ..... N78-33389 #
TR-20 ..... N78-33486 #
TR-54 ..... N78-33836 #
TR-56 ..... N78-33862 #
TR-78-7 ..... N78-33315 #
TR-0078(3451-03)-1 ..... N78-33136 #
TR-4009 ..... N78-33381*#

TREE-1182 ..... N78-33567 #

TRW-28600-AR-016-01-REV-A ..... N78-33344 #
TRW-31183-6001-RU-00 ..... N78-33379*#
TRW-32052-6009-RU-00 ..... N78-33266*#

TR080 ..... N78-33405*#

TSARCOM-TR-78-4 ..... N78-33091 #

TTCSL-OLT-3 ..... N78-33413 #

UAH-RR-203-VOL-2 ..... N78-33451 #

UCID-17750 ..... N78-33799 #
UCID-17755-PT-1 ..... N78-33492 #

UCLA-ENG-7766 ..... N78-33937 #
UCLA-ENG-7769 ..... N78-33936 #
UCLA-ENG-7780 ..... N78-33935 #

UCRL-13829 ..... N78-33268 #

UCRL-51444-77 ..... N78-33624 #
UCRL-52434-VOL-1 ..... N78-33244 #
UCRL-52434-VOL-2 ..... N78-33242 #
UCRL-52464 ..... N78-33493 #
UCRL-80038 ..... N78-33174 #
UCRL-80438 ..... N78-33212 #
UCRL-80656 ..... N78-33944 #
UCRL-80868 ..... N78-33491 #
UCRL-80874 ..... N78-33589 #
UCRL-80896 ..... N78-33177 #

UILU-ENG-77-2232 ..... N78-33297 #
UILU-ENG-77-2234 ..... N78-33794 #
UILU-ENG-77-2236 ..... N78-33165 #
UILU-ENG-77-2243 ..... N78-33303 #
UILU-ENG-77-2243 ..... N78-33751 #
UILU-ENG-78-0505 ..... N78-33048*#
UILU-ENG-78-2501 ..... N78-33653*#
UILU-ENG-78-2544 ..... N78-33296 #

UMASS-ARF-77-304 ..... N78-33663 #

UMM/DTS/TR-319 ..... N78-33870 #

UNICF-FSP-78/1 ..... N78-33931 #

UNTA-MA-06-0049-77-8 ..... N78-34010 #

UR-3490-1341 ..... N78-33704 #

US-PATENT-APPL-SN-588721 ..... N78-33228*
US-PATENT-APPL-SN-668971 ..... N78-33101*
US-PATENT-APPL-SN-716885 ..... N78-33913*
US-PATENT-APPL-SN-718268 ..... N78-33526*
US-PATENT-APPL-SN-878253 ..... N78-33164*#
US-PATENT-APPL-SN-883383 ..... N78-33715*#
US-PATENT-APPL-SN-934576 ..... N78-33123*#
US-PATENT-APPL-SN-945041 ..... N78-33511*#
US-PATENT-APPL-SN-946991 ..... N78-33446*#
US-PATENT-APPL-SN-951422 ..... N78-33717*#

US-PATENT-CLASS-29-463 ..... N78-33101*
US-PATENT-CLASS-74-572 ..... N78-33101*
US-PATENT-CLASS-123-DIG.12 ..... N78-33526*
US-PATENT-CLASS-123-1A N78-33526*
US-PATENT-CLASS-123-3 ..... N78-33526*
US-PATENT-CLASS-250-218 ..... N78-33913*
US-PATENT-CLASS-250-227 ..... N78-33913*
US-PATENT-CLASS-250-239 ..... N78-33913*
US-PATENT-CLASS-260-28.5 ..... N78-33228*
US-PATENT-CLASS-356-208 ..... N78-33913*
US-PATENT-CLASS-416-214A N78-33101*
US-PATENT-CLASS-416-244A N78-33101*

US-PATENT-3,527,724 ..... N78-33228*
US-PATENT-3,573,470 ..... N78-33913*
US-PATENT-4,097,194 ..... N78-33101*
US-PATENT-4,112,875 ..... N78-33526*

USAARL-78-6 ..... N78-33738 #

USAAVRADCOM-TR-78-29-VOL-1 ..... N78-33200 #
USAAVRADCOM-TR-78-29-VOL-2 ..... N78-33201 #

USARTL-TR-78-20 ..... N78-33093 #

USGS/GD-78/009 ..... N78-33669 #

UTRC/R77-953500-27 ..... N78-33946 #
UTRC/R78-922853 ..... N78-33428 #
UTRC 78-106 ..... N78-33044*#

VPI-E-78-27 ..... N78-33481*#

WQEC/C-77-87 ..... N78-33539*#

W78-07052 ..... N78-33182 #

Y-DA-7472 ..... N78-33437 #
Y-DA-7591 ..... N78-33436 #

Y-2114 ..... N78-33452 #
Y-2129 ..... N78-33453 #

YPG-339 ..... N78-33309 #

☆U.S. GOVERNMENT PRINTING OFFICE: 1978—281-439:24

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools tc eleven special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley

COLORADO
University of Colorado, Boulder

DISTRICT OF COLUMBIA
Library of Congress

GEORGIA
Georgia Institute of Technology, Atlanta

ILLINOIS
The John Crerar Library, Chicago

MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge

MISSOURI
Linda Hall Library, Kansas City

NEW YORK
Columbia University, New York

OKLAHOMA
University of Oklahoma, Bizzell Library

PENNSYLVANIA
Carnegie Library of Pittsburgh

WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library

COLORADO
Denver Public Library

CONNECTICUT
Hartford Public Library

MARYLAND
Enoch Pratt Free Library, Baltimore

MASSACHUSETTS
Boston Public Library

MICHIGAN
Detroit Public Library

MINNESOTA
Minneapolis Public Library

MISSOURI
Kansas City Public Library
St. Louis Public Library

NEW JERSEY
Trenton Public Library

NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library

OHIO
Akron Public Library
Cincinnati Public Library
Cleveland Public Library
Dayton Public Library
Toledo Public Library

TENNESSEE
Memphis Public Library

TEXAS
Dallas Public Library
Fort Worth Public Library

WASHINGTON
Seattle Public Library

WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, New York 10017.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy of microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESA - Space Documentation Service, European Space Agency, 8-10 rue Mario-Nikis, 75738 Paris CEDEX 15, France.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

SPECIAL FOURTH CLASS MAIL
Book

POSTAGE AND FEES PAID
NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
NASA-451

U.S.MAIL

POSTMASTER: If undeliverable (Section 158 Postal Manual) Do Not Return